



REPORT No.: SZ24110315W04

TEST REPORT

APPLICANT : Anker Innovations Limited

PRODUCT NAME : NEBULA X1

MODEL NAME : D2351

BRAND NAME : NEBULA

FCC ID : 2AOKB-D2351

STANDARD(S) : 47 CFR Part 15 Subpart C

RECEIPT DATE : 2024-12-11

TEST DATE : 2024-12-24 to 2025-01-21

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Edited by: Su Xiaoxian
Su Xiaoxian (Rapporteur)

Approved by: Shen Junsheng
Shen Junsheng (Supervisor)

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MORLAB

Shenzhen Morlab Communications Technology Co., Ltd.
FL.1-3, Building A, FeiYang Science Park, No.8 LongChang Road,
Block67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

Tel: 86-755-36698555

Http://www.morlab.cn

Fax: 86-755-36698525

E-mail: service@morlab.cn





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Change History		
Version	Date	Reason for change
1.0	2025-01-24	First edition



1. Summary of Test Result

No.	Section	Description	Test Date	Test Engineer	Result	Method Determination /Remark
1	15.203	Antenna Requirement	N/A	N/A	PASS	No deviation
2	15.247(a) 15.247(h)	Hopping Mechanism	N/A	N/A	PASS	No deviation
3	15.247(a)	Number of Hopping Frequency	Jan. 06, 2025	Li Zikai	PASS	No deviation
4	ANSI C63.10	Duty Cycle	Jan. 06, 2025	Li Zikai	PASS	No deviation
5	15.247(b)	Maximum Peak Conducted Output Power	Jan. 06, 2025	Li Zikai	PASS	No deviation
6	15.247(b)	Maximum Average Conducted Output Power	Jan. 06, 2025	Li Zikai	PASS	No deviation
7	15.247(a)	20dB Bandwidth	Jan. 06, 2025	Li Zikai	PASS	No deviation
8	15.247(a)	Carrier Frequency Separation	Jan. 06, 2025	Li Zikai	PASS	No deviation
9	15.247(a)	Time of Occupancy (Dwell time)	Jan. 06, 2025	Li Zikai	PASS	No deviation
10	15.247(d)	Conducted Spurious Emission and Band Edge	Jan. 06, 2025	Li Zikai	PASS	No deviation
11	15.207	Conducted Emission	Dec. 28, 2024	Fan Shengquan	PASS	No deviation
12	15.247(d)	Restricted Frequency Bands	Dec. 26, 2024	Gao Jianrou	PASS	No deviation



13	15.209, 15.247(d)	Radiated Emission	Dec. 24&26, 2024	Gao Jianrou	PASS	No deviation
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Note 1: The tests were performed according to the method of measurements prescribed in ANSI C63.10-2013, KDB 558074 D01 v05r02 and DA 00-075.

Note 2: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

Note 3: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

1.1. Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 15 Subpart C Radio Frequency Devices



1.2. Test Equipment List

1.2.1 Conducted Test Equipment

Equipment	Serial No.	Type	Manufacturer	Cal. Date	Due Date
EXA Signal Analyzer	MY53470836	N9010A	Agilent	2024.02.19	2025.02.18
RF Cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
SMA Connector	CN01	RF03	HUBER-SUHNER	N/A	N/A

1.2.2 Conducted Emission Test Equipment

Equipment	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY56400093	N9038A	KEYSIGHT	2024.01.25	2025.01.24
LISN	8127449	NSLK 8127	Schwarzbeck	2024.02.02	2025.02.01
Pulse Limiter (10dB)	VTSD 9561 F- B #206	VTSD 9561-F	Schwarzbeck	2024.05.30	2025.05.29
RF Coaxial Cable (DC-100MHz)	BNC	MRE04	Qualwave	2024.07.02	2025.07.01

1.2.3 List of Software Used

Description	Manufacturer	Software Version
Test System	MaiWei	V2.0.0.0
TS+ -[JS36-RSE]	Tonscend	V3.0.0.0
TS+ -[JS32-CE]	Tonscend	V2.5.0.0
TS+	Tonscend	V5.0.0

**1.2.4 Radiated Test Equipment**

Equipment	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Signal Analyzer	MY56060145	N9020A	Agilent	2024.05.30	2025.05.29
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2024.06.22	2025.06.21
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2024.06.03	2025.06.02
Test Antenna – Horn	01774	BBHA 9120D	Schwarzbeck	2024.06.22	2025.06.21
Test Antenna – Horn	BBHA9170 #773	BBHA9170	Schwarzbeck	2024.06.22	2025.06.21
Preamplifier (10MHz-6GHz)	46732	S10M100L38 02	LUCIX CORP.	2024.05.30	2025.05.29
Preamplifier (2GHz-18GHz)	61171/61172	S020180L32 03	LUCIX CORP.	2024.05.30	2025.05.29
Preamplifier (18GHz-40GHz)	DS77209	DCLNA0118-40C-S	Decentest	2024.05.30	2025.05.29
RF Coaxial Cable (DC-18GHz)	MRE001	PE330	Pasternack	2024.05.30	2025.05.29
RF Coaxial Cable (DC-18GHz)	MRE002	CLU18	Pasternack	2024.05.30	2025.05.29
RF Coaxial Cable (DC-18GHz)	MRE003	CLU18	Pasternack	2024.05.30	2025.05.29
RF Coaxial Cable (DC-40GHz)	22290045	QA360-40-KK-0.5	Qualwave	N/A	N/A
RF Coaxial Cable (DC-40GHz)	22290046	QA360-40-KKF-2	Qualwave	N/A	N/A
RF Coaxial Cable (DC-18GHz)	22120181	QA500-18-NN-5	Qualwave	N/A	N/A
Notch Filter	N/A	WRCG-2400-2483.5-60SS	Wainwright	N/A	N/A
Anechoic Chamber	N/A	9m*6m*6m	CRT	2022.05.10	2025.05.09



1.3. Measurement Uncertainty

Test Items	Uncertainty	Remark
Number of Hopping Frequency	±5%	Confidence levels of 95%
Peak Output Power	±2.22dB	Confidence levels of 95%
Bandwidth	±5%	Confidence levels of 95%
Carrier Frequency Separation	±5%	Confidence levels of 95%
Time of Occupancy (Dwell time)	±5%	Confidence levels of 95%
Conducted Spurious Emission	±2.77dB	Confidence levels of 95%
Restricted Frequency Bands	±5%	Confidence levels of 95%
Radiated Emission	±2.95dB	Confidence levels of 95%
Conducted Emission	±2.44dB	Confidence levels of 95%

1.4. Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Laboratory Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525
FCC Designation Number:	CN1192
FCC Test Firm Registration Number:	226174



2. General Description

2.1. Information of Applicant and Manufacturer

Applicant:	Anker Innovations Limited
Applicant Address:	Unit 56, 8th Floor, Tower 2, Admiralty Centre, 18 Harcourt Road, Hong Kong
Manufacturer:	Anker Innovations Limited
Manufacturer Address:	Unit 56, 8th Floor, Tower 2, Admiralty Centre, 18 Harcourt Road, Hong Kong

2.2. Information of EUT

Product Name:	NEBULA X1	
Sample No.:	1#, 2#, 3#	
Hardware Version:	V03	
Software Version:	V11.0.18.7	
Equipment Type:	Bluetooth classic	
Bluetooth Version:	5.1	
Modulation Type:	FHSS (GFSK(1Mbps), $\pi/4$ -DQPSK(EDR 2Mbps), 8-DPSK(EDR 3Mbps))	
Operating Frequency Range:	2402MHz-2480MHz	
Antenna Type:	Dipole Antenna	
Antenna Gain:	4.7dBi	
Accessory Information:	AC Adapter	
	Brand Name:	N/A
	Model No.:	NSA240EC-22010900
	Serial No.:	N/A
	Rated Output:	100-240V~ 50/60Hz, 2.5A
	Rated Input:	22.0V=10.9A
	Manufacturer:	Shenzhen JingQuanHua&Everrise Intelligent Electric Co., Ltd.

Note 1: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.



2.3.Channel List of EUT

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

Note 1: The black bold channels were selected for test.

2.4. Test Configuration of EUT

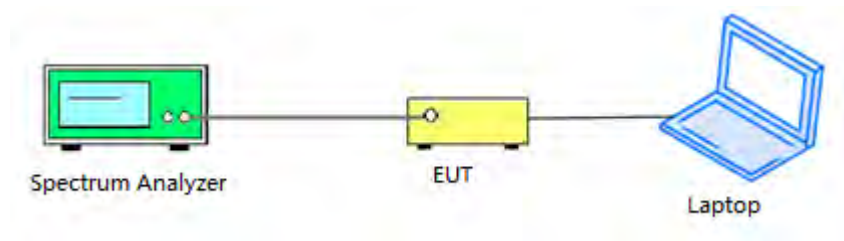
Test mode is used to control the EUT under the maximum power level during test.

2.5. Test Conditions

Temperature (°C):	15-35
Relative Humidity (%):	30-60
Atmospheric Pressure (kPa):	86-106

2.6. Test Setup Layout Diagram

2.6.1. Conducted Measurement

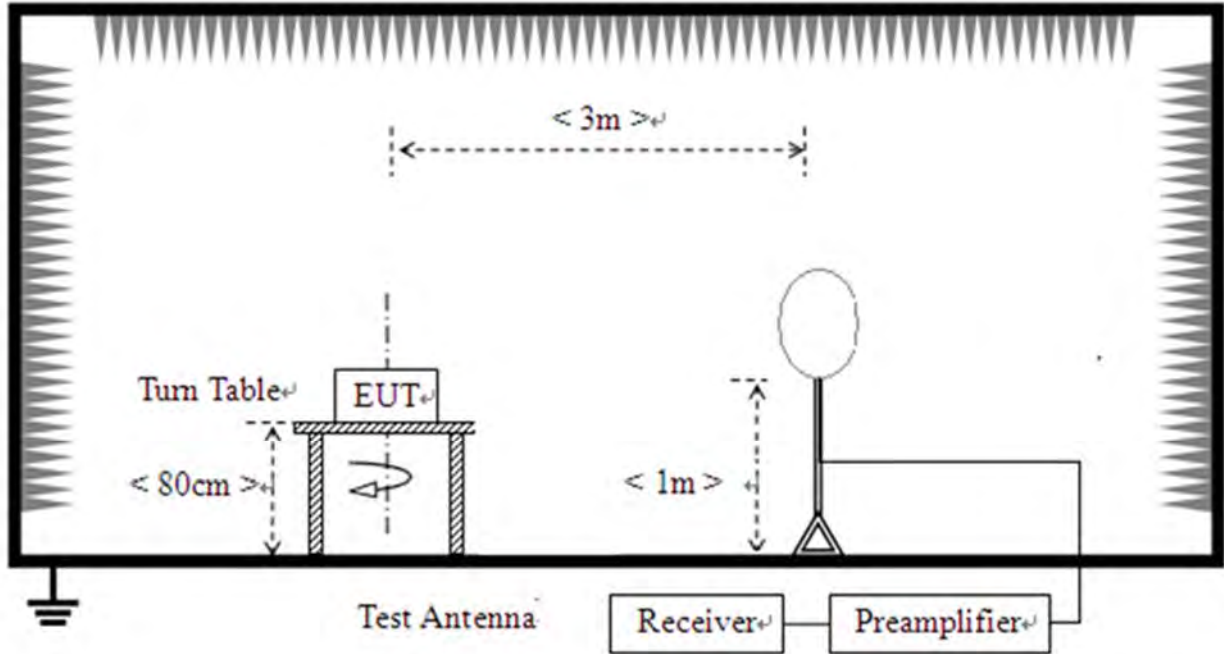


2.6.2. Conducted Emission Measurement

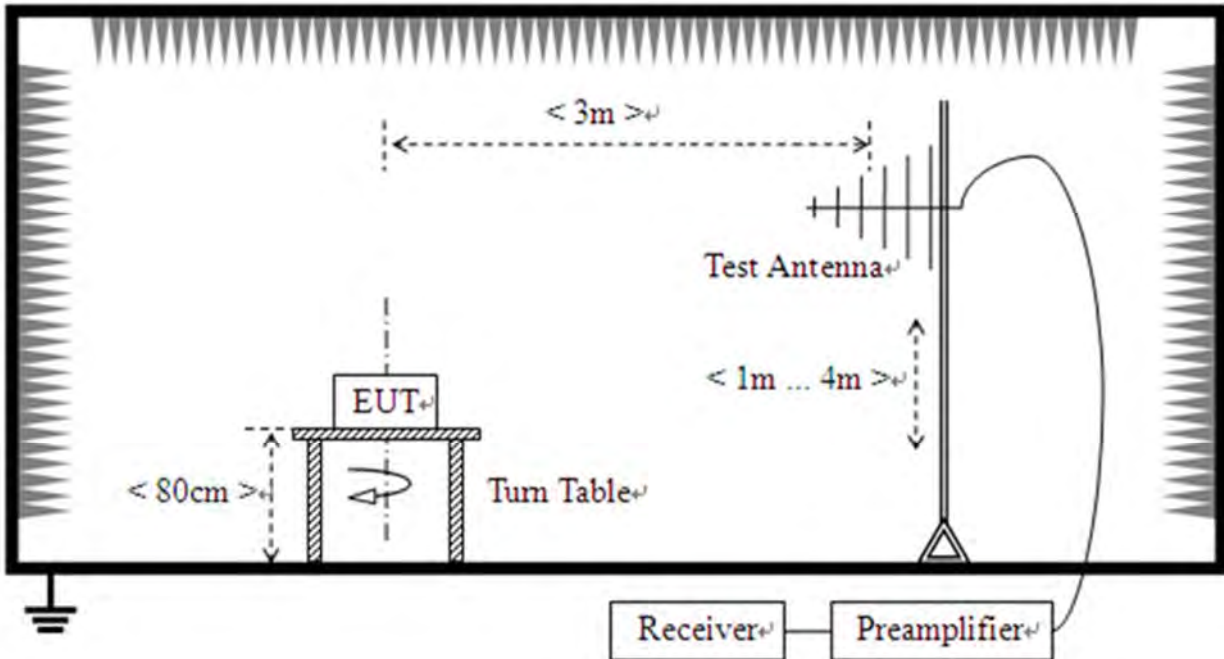


2.6.3.Radiation Measurement

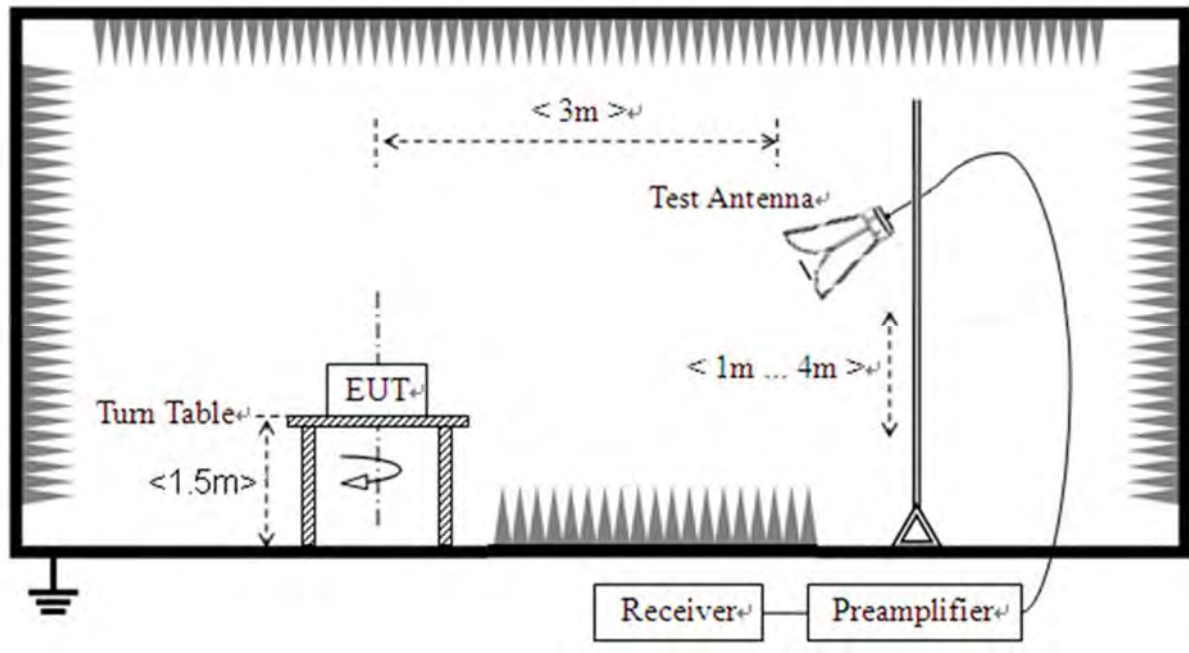
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to 1GHz



3) For radiated emissions above 1GHz





3. Test Results

3.1. Antenna Requirement

3.1.1. Requirement

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

3.1.2. Test Result

Antenna location	Antenna Type	Coupling Method
☒ Internal ☐ External	☐ FPC Antenna ☐ Spring Antenna ☐ Ceramic Antenna ☐ Integrated Antenna ☒ Dipole Antenna ☐ PCB Antenna ☐ PIFA Antenna ☐ On-board Antenna	☒ I-PEX Connector ☐ SMA Connector ☐ RP-SMA Connector ☐ Metal Shrapnel ☐ Layout



3.2. Hopping Mechanism

3.2.1. Requirement

According to FCC section 15.247(a)(1), a frequency hopping spread spectrum system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

According to FCC section 15.247(h), the incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hop sets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

3.2.2. Test Result

The hopping mechanism of the EUT is in compliance with the document "**Bluetooth core specification v5.1**".



3.3. Number of Hopping Frequency

3.3.1. Requirement

According to FCC section 15.247(a)(1)(iii), frequency hopping systems operating in the 2400MHz to 2483.5MHz bands shall use at least 15 hopping frequencies.

3.3.2. Test Procedures

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = the frequency band of operation

RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize

3.3.3. Test Setup Layout

Refer to chapter 2.6.1 in this report.

3.3.4. Test Result

Refer to Annex A.1 in this report.



3.4. Duty Cycle of Test Signal

3.4.1. Requirement

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration (T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data are being acquired (i.e., no transmitter OFF-time is to be considered).

When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). Within this sub clause, the duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than $\pm 2\%$; otherwise, the duty cycle is considered to be non constant.

3.4.2. Test Result

Refer to Annex A.2 in this report.



3.5. Maximum Peak Conducted Output Power

3.5.1. Requirement

According to FCC section 15.247(b)(1), for frequency hopping systems that operates in the 2400MHz to 2483.5MHz band employing at least 75 hopping channels, the maximum peak output power of the intentional radiator shall not exceed 1Watt. For all other frequency hopping systems in the 2400MHz to 2483.5MHz band, it is 0.125Watts.

3.5.2. Test Procedures

KDB 558074 Section 8.3.1 was used in order to prove compliance.

3.5.3. Test Setup Layout

Refer to chapter 2.6.1 in this report.

3.5.4. Test Result

Refer to Annex A.3 in this report.



3.6. Maximum Average Conducted Output Power

3.6.1. Requirement

According to FCC section 15.247(b)(1), for frequency hopping systems that operates in the 2400MHz to 2483.5MHz band employing at least 75 hopping channels, the maximum peak output power of the intentional radiator shall not exceed 1Watt. For all other frequency hopping systems in the 2400MHz to 2483.5MHz band, it is 0.125Watts.

3.6.2. Test Procedures

KDB 558074 Section 8.3.2 was used in order to prove compliance.

3.6.3. Test Setup Layout

Refer to chapter 2.6.1 in this report.

3.6.4. Test Result

Refer to Annex A.4 in this report.



3.7.20 dB Bandwidth

3.7.1.Requirement

According to FCC section 15.247(a)(1), the 20 dB bandwidth is known as the 99% emission bandwidth, or 20 dB bandwidth ($10 \cdot \log 1\% = 20 \text{ dB}$) taking the total RF output power.

3.7.1.Test Procedures

Use the following spectrum analyzer settings:

Span = between 2 to 5 times the OBW, centered on the test channel

RBW= 1% to 5% of the OBW

VBW $\geq 3 \times$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

3.7.2.Test Setup Layout

Refer to chapter 2.6.1 in this report.

3.7.3.Test Result

Refer to Annex A.5 in this report.



3.8. Carried Frequency Separation

3.8.1. Requirement

According to FCC section 15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

3.8.2. Test Procedures

The EUT must have its hopping function enabled. According to DA 00-705, use the following spectrum analyzer settings:

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW) $\geq 1\%$ of the span

Video (or Average) Bandwidth (VBW) $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

3.8.3. Test Setup Layout

Refer to chapter 2.6.1 in this report.

3.8.4. Test Result

Refer to Annex A.6 in this report.



3.9. Time of Occupancy (Dwell time)

3.9.1. Requirement

According to FCC section 15.247(a) (1) (iii), frequency hopping systems in the 2400 - 2483.5MHz band shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

3.9.2. Test Procedures

Normal Mode:

DH1: Dwell time equal to Pulse time (ms) $\times (1600 / 2 / 79) \times 31.6$ Millisecond
DH3: Dwell time equal to Pulse time (ms) $\times (1600 / 4 / 79) \times 31.6$ Millisecond
DH5: Dwell time equal to Pulse Time (ms) $\times (1600 / 6 / 79) \times 31.6$ Millisecond

AFH Mode:

DH1: Dwell time equal to Pulse time (ms) $\times (800 / 2 / 20) \times (0.4 \times 20)$ Millisecond
DH3: Dwell time equal to Pulse time (ms) $\times (800 / 4 / 20) \times (0.4 \times 20)$ Millisecond
DH5: Dwell time equal to Pulse Time (ms) $\times (800 / 6 / 20) \times (0.4 \times 20)$ Millisecond.

3.9.3. Test Setup Layout

Refer to chapter 2.6.1 in this report.

3.9.4. Test Result

Refer to Annex A.7 in this report.



3.10. Conducted Spurious Emissions and Band Edge

3.10.1.Requirement

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

3.10.2.Test Procedures

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

RBW = 100 kHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize.

3.10.3.Test Setup Layout

Refer to chapter 2.6.1 in this report.

3.10.4.Test Result

Refer to Annex A.8 and A.9 in this report.

3.11. Conducted Emission

3.11.1.Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN).

Frequency Range (MHz)	Conducted Limit (dB μ V)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

Note:

- (a) The lower limit shall apply at the band edges.
- (b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

3.11.2.Test Procedures

The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.

3.11.3.Test Setup Layout

Refer to chapter 2.6.2 in this report.

3.11.4.Test Result

Refer to Annex A.10 in this report.



3.12. Restricted Frequency Bands

3.12.1.Requirement

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

3.12.2.Test Procedures

The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1\text{GHz}$, 100 kHz for $f < 1\text{GHz}$

VBW = 3 MHz

Sweep = auto

Detector function = peak/average

Trace = max hold

Allow the trace to stabilize

3.12.3.Test Setup Layout

Refer to chapter 2.6.3 in this report.

3.12.4.Test Result

Refer to Annex A.11 in this report.

3.13. Radiated Emission

3.13.1.Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Note1: For above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.

Note2:For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table).



3.13.2.Test Procedures

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 30MHz, the emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9kHz-90 kHz, 110kHz-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

For measurements below 1GHz the resolution bandwidth is set to 100kHz for peak detection measurements or 120kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements and as applicable for average measurements.

The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions. For measurements above 1 GHz, keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.

3.13.3.Test Setup Layout

Refer to chapter 2.6.3 in this report.

3.13.4.Test Result

Refer to Annex A.12 in this report.



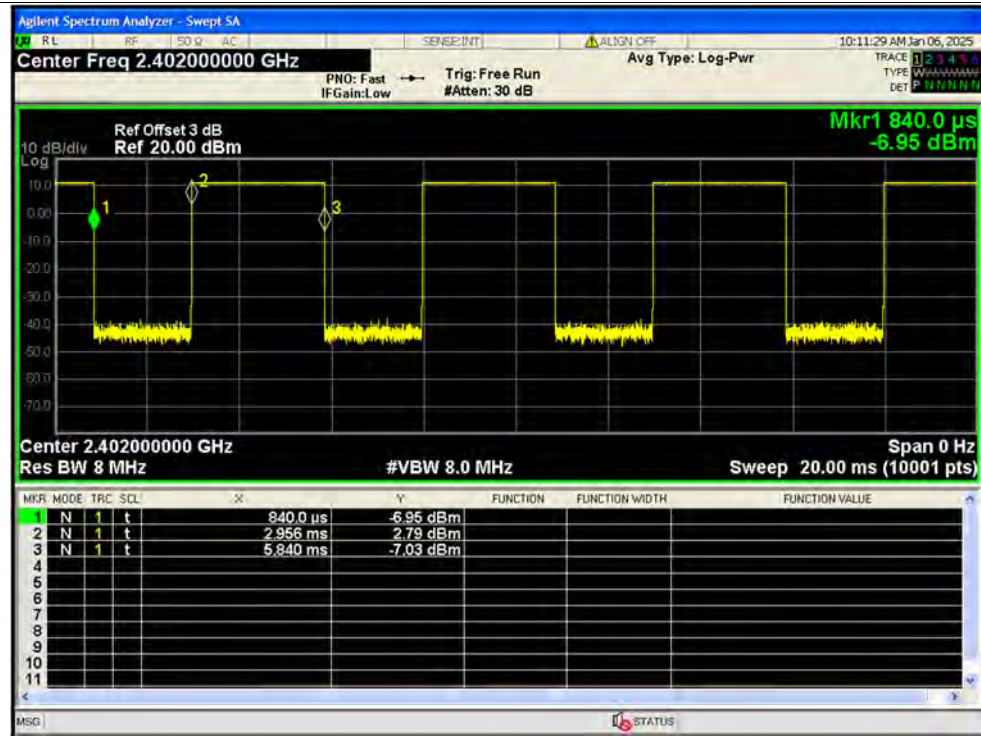
Annex A Test Data and Result

A.1. Number of Hopping Frequency

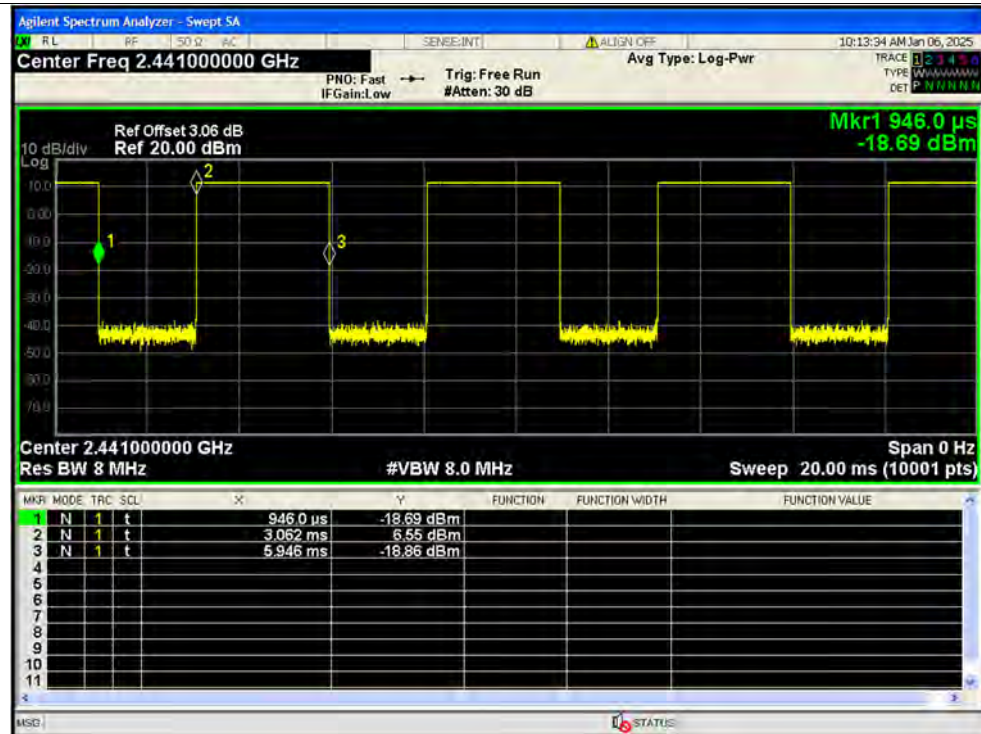
Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	1-DH5	2402	Ant1	57.68	2.39	0.35
NVNT	1-DH5	2441	Ant1	57.68	2.39	0.35
NVNT	1-DH5	2480	Ant1	57.68	2.39	0.35
NVNT	2-DH5	2402	Ant1	57.76	2.38	0.35
NVNT	2-DH5	2441	Ant1	57.72	2.39	0.35
NVNT	2-DH5	2480	Ant1	57.72	2.39	0.35
NVNT	3-DH5	2402	Ant1	57.76	2.38	0.35
NVNT	3-DH5	2441	Ant1	57.76	2.38	0.35
NVNT	3-DH5	2480	Ant1	57.76	2.38	0.35

Test Graphs

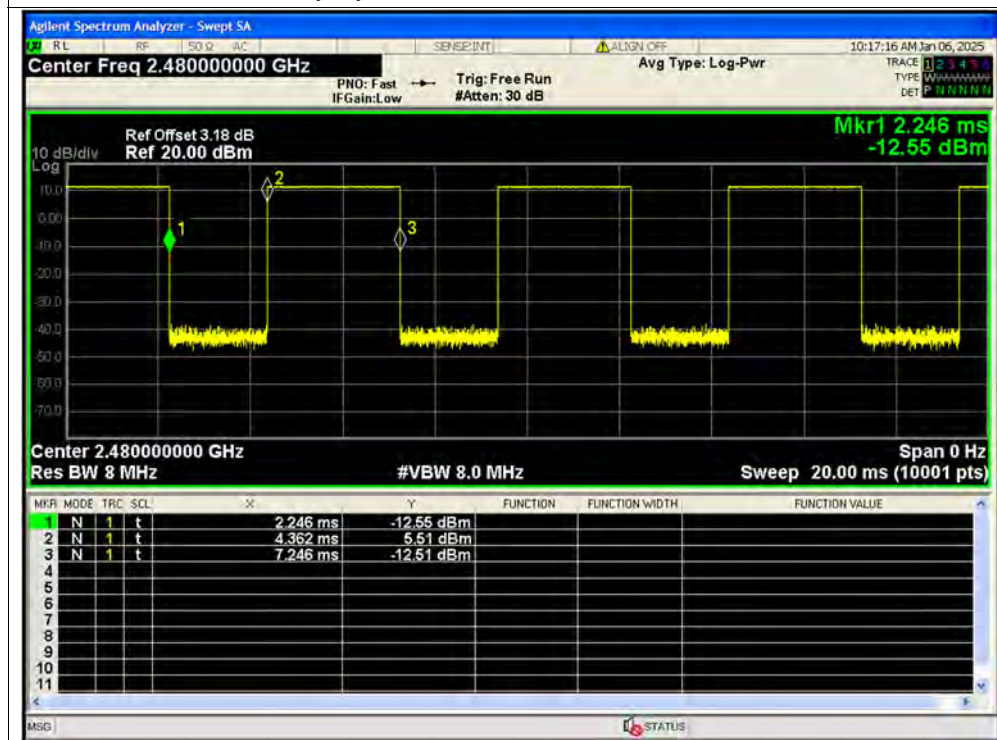
Duty Cycle NVNT 1-DH5 2402MHz Ant1



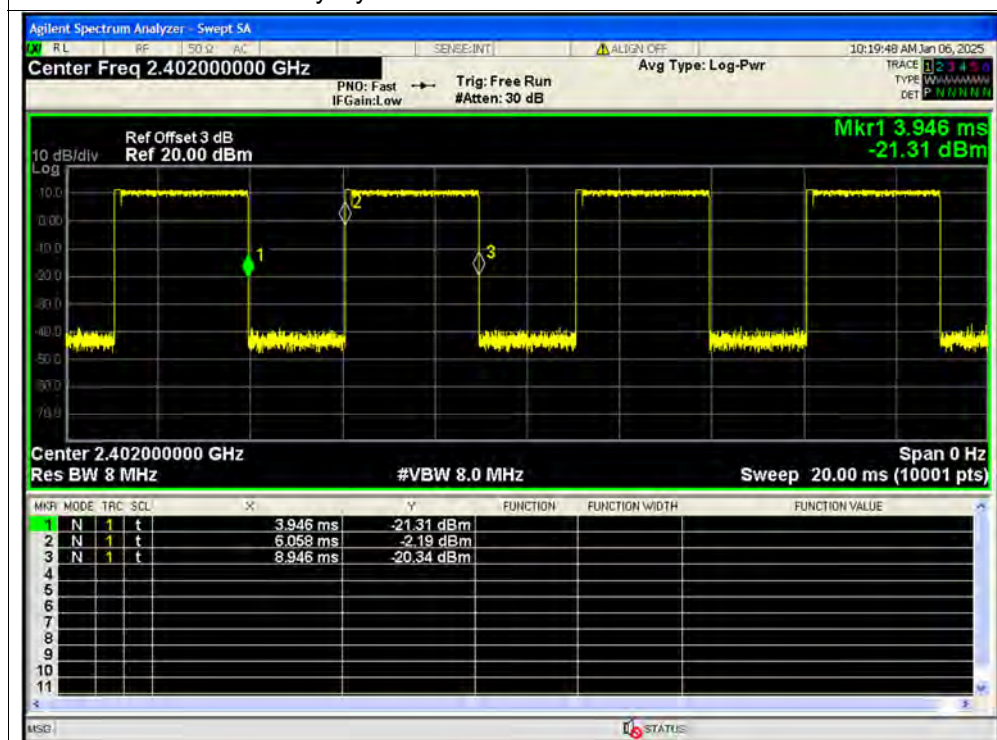
Duty Cycle NVNT 1-DH5 2441MHz Ant1



Duty Cycle NVNT 1-DH5 2480MHz Ant1

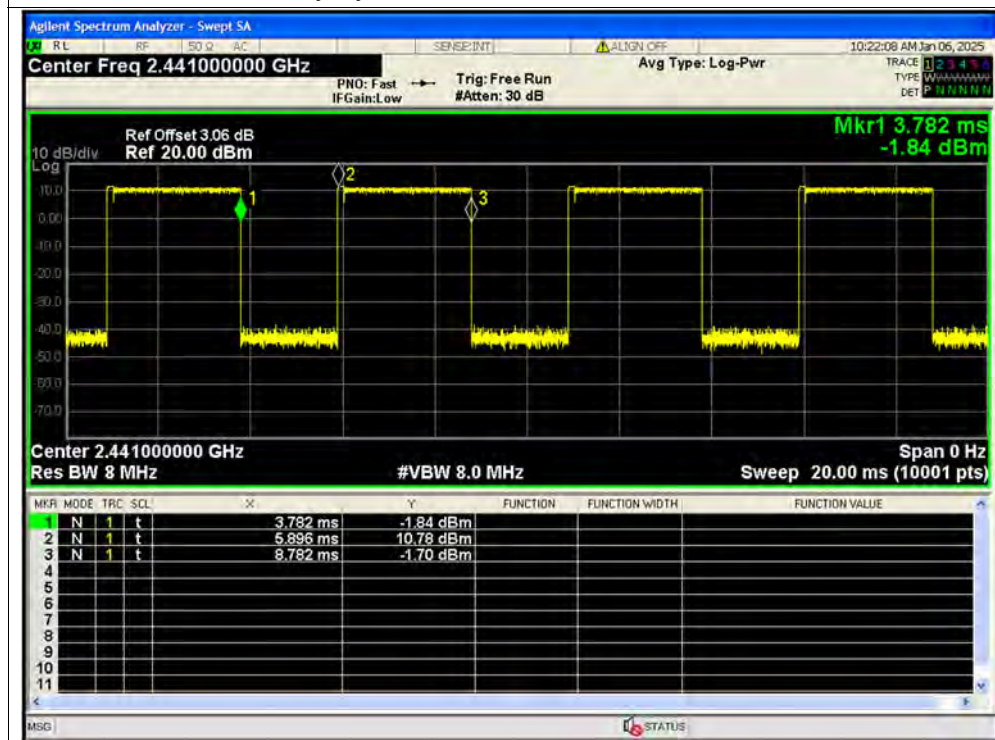


Duty Cycle NVNT 2-DH5 2402MHz Ant1

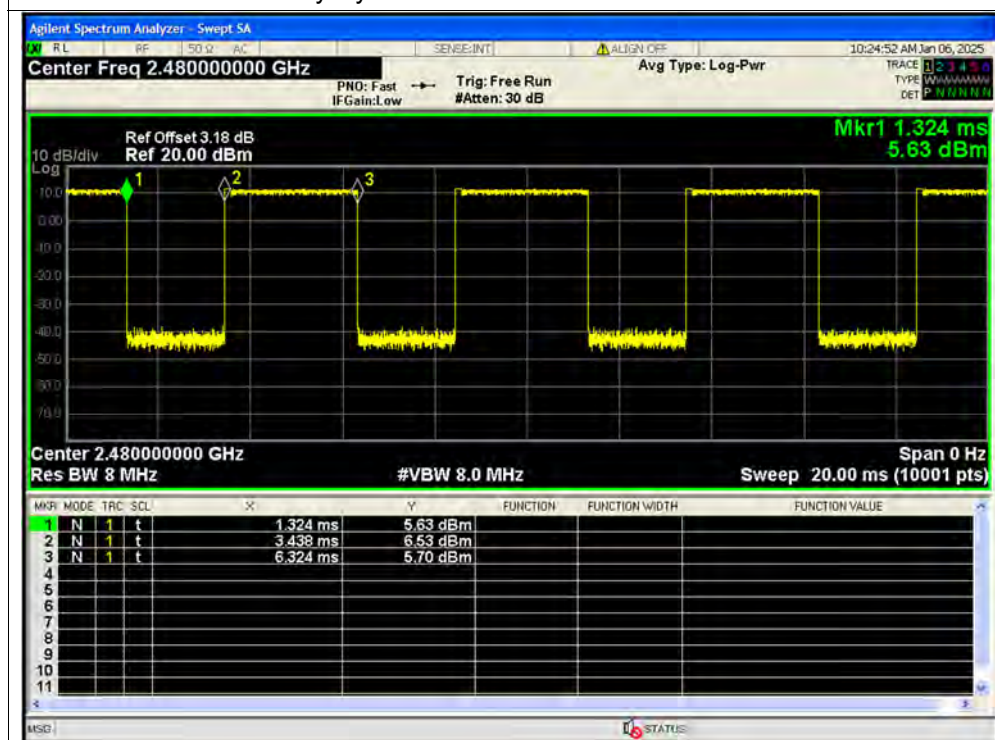




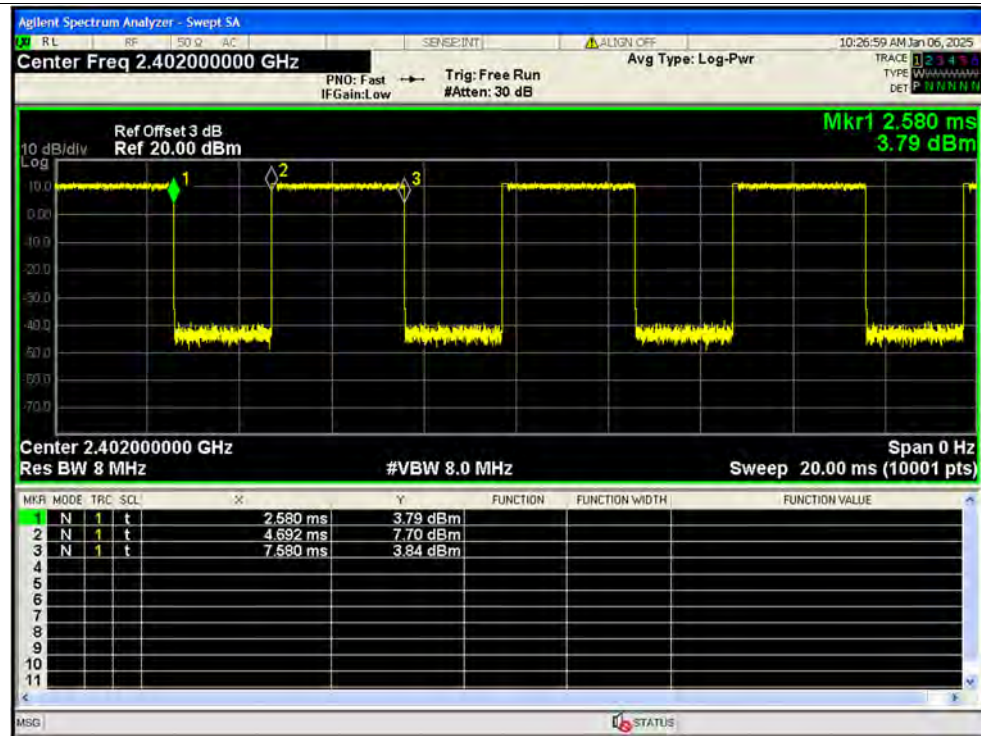
Duty Cycle NVNT 2-DH5 2441MHz Ant1



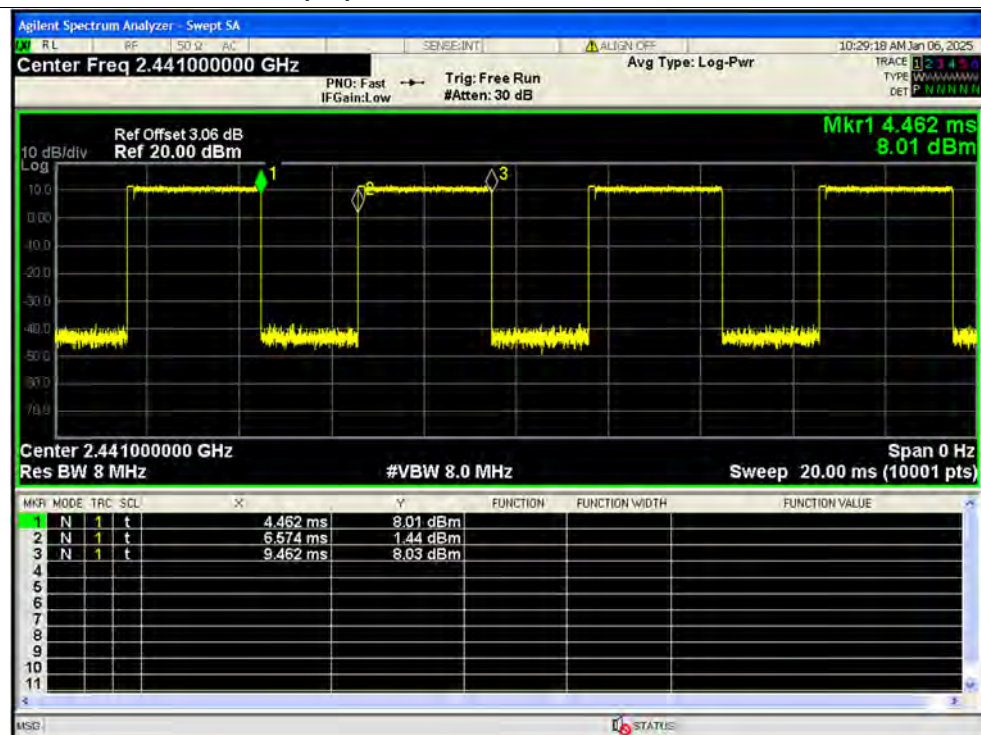
Duty Cycle NVNT 2-DH5 2480MHz Ant1



Duty Cycle NVNT 3-DH5 2402MHz Ant1

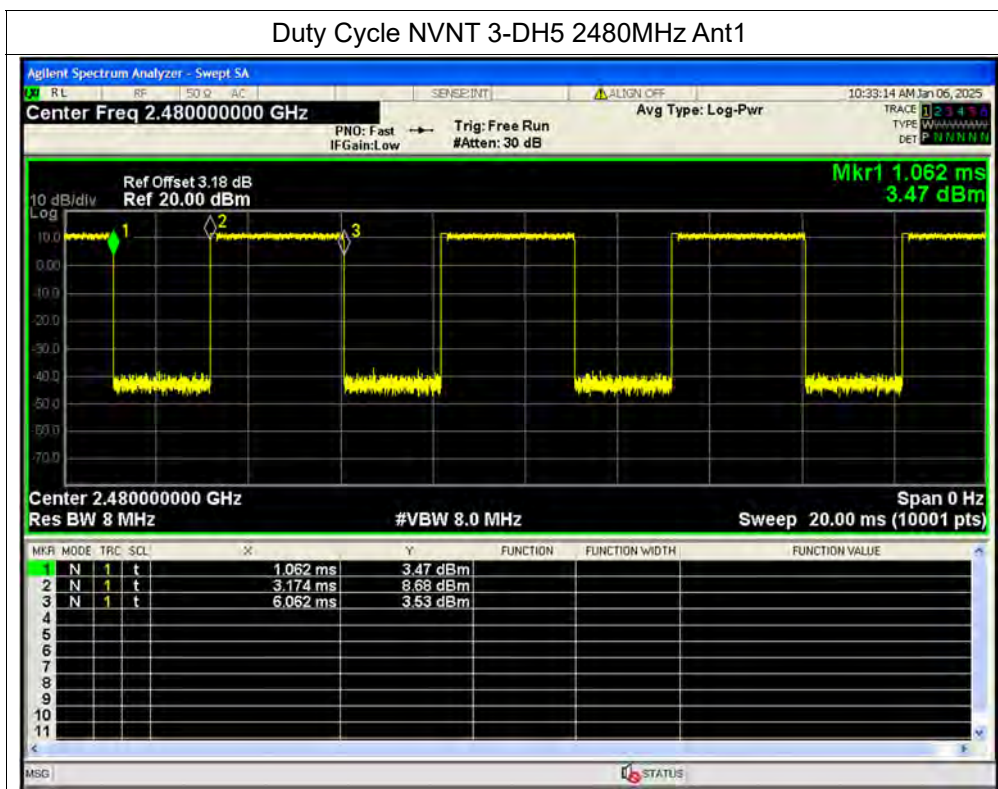


Duty Cycle NVNT 3-DH5 2441MHz Ant1





Duty Cycle NVNT 3-DH5 2480MHz Ant1

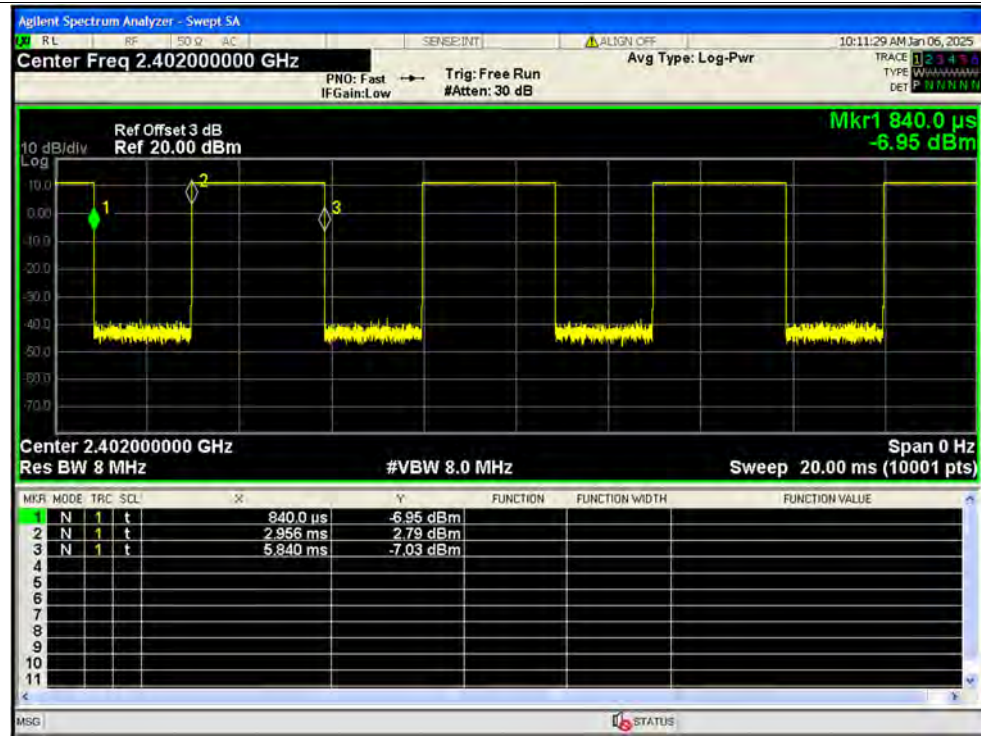


**A.2. Duty Cycle of Test Signal**

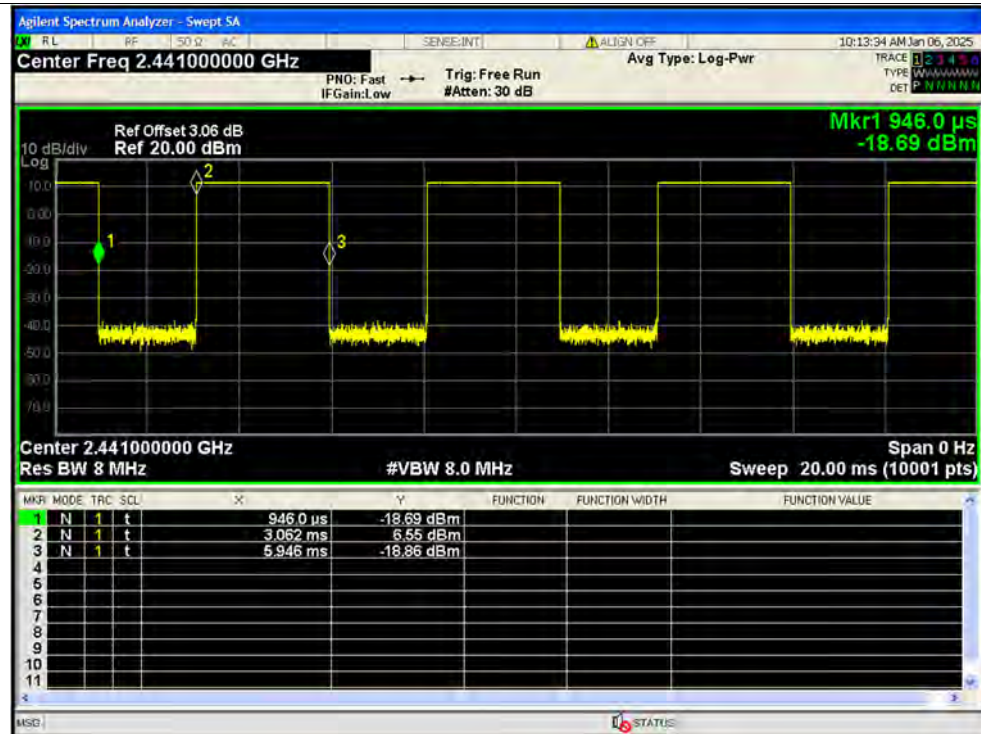
Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	1-DH5	2402	Ant1	57.68	2.39	0.35
NVNT	1-DH5	2441	Ant1	57.68	2.39	0.35
NVNT	1-DH5	2480	Ant1	57.68	2.39	0.35
NVNT	2-DH5	2402	Ant1	57.76	2.38	0.35
NVNT	2-DH5	2441	Ant1	57.72	2.39	0.35
NVNT	2-DH5	2480	Ant1	57.72	2.39	0.35
NVNT	3-DH5	2402	Ant1	57.76	2.38	0.35
NVNT	3-DH5	2441	Ant1	57.76	2.38	0.35
NVNT	3-DH5	2480	Ant1	57.76	2.38	0.35

Test Graphs

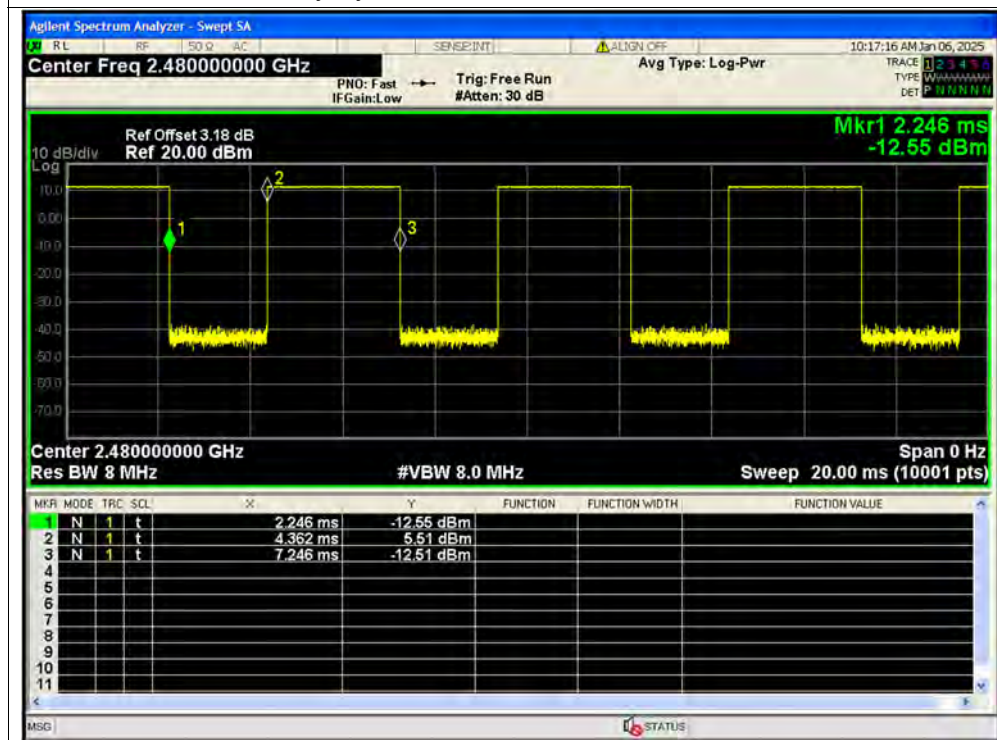
Duty Cycle NVNT 1-DH5 2402MHz Ant1



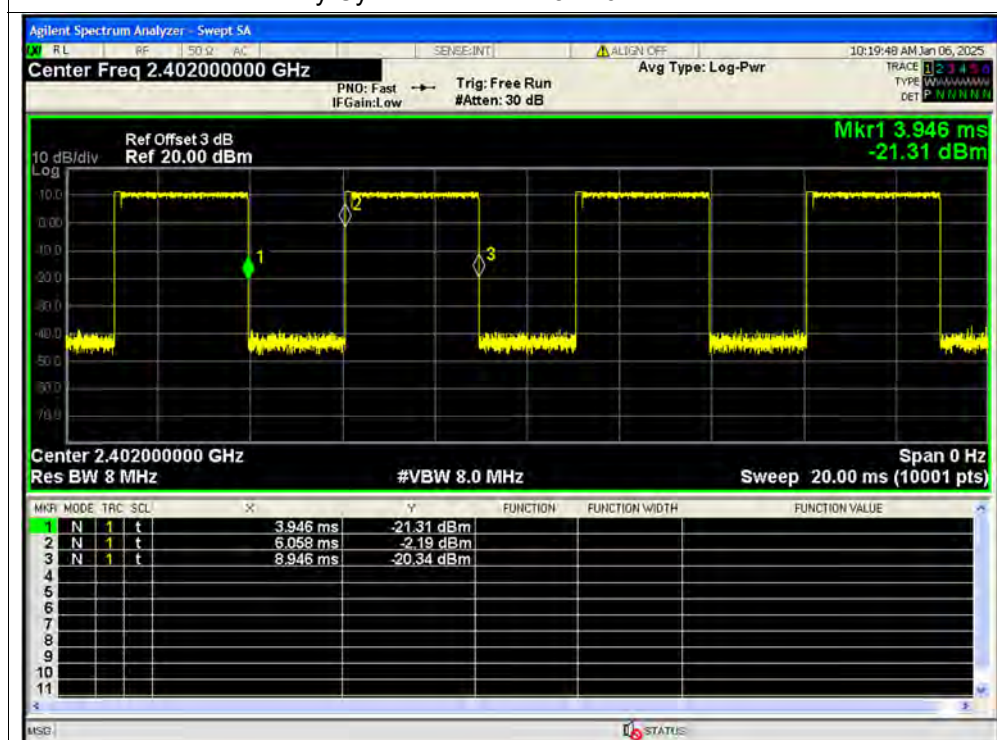
Duty Cycle NVNT 1-DH5 2441MHz Ant1



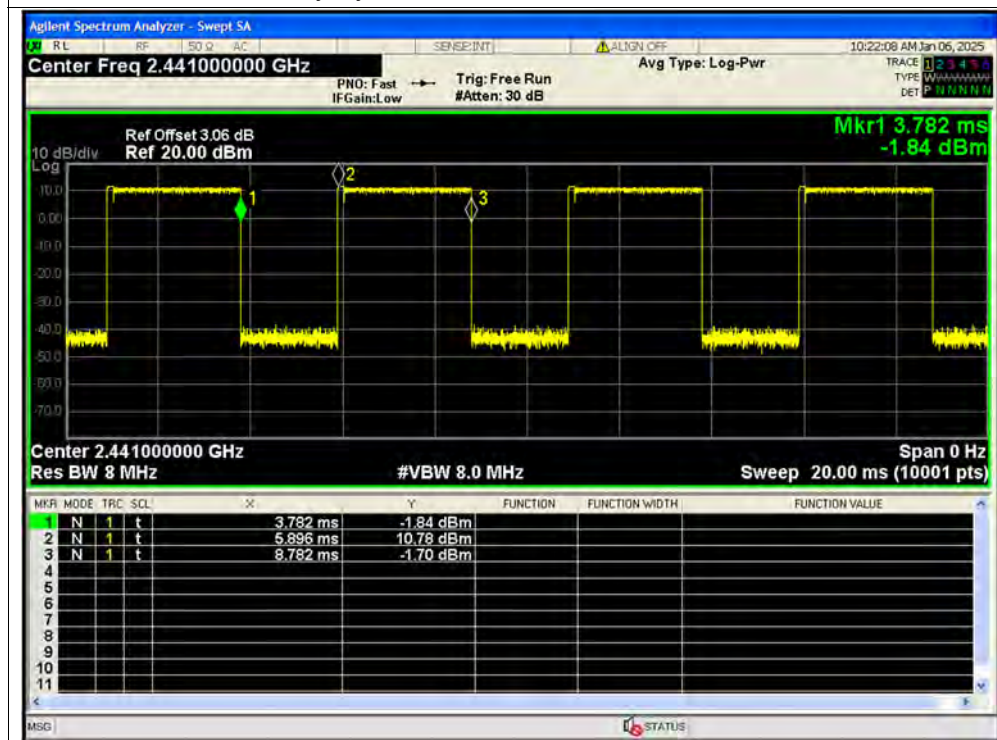
Duty Cycle NVNT 1-DH5 2480MHz Ant1



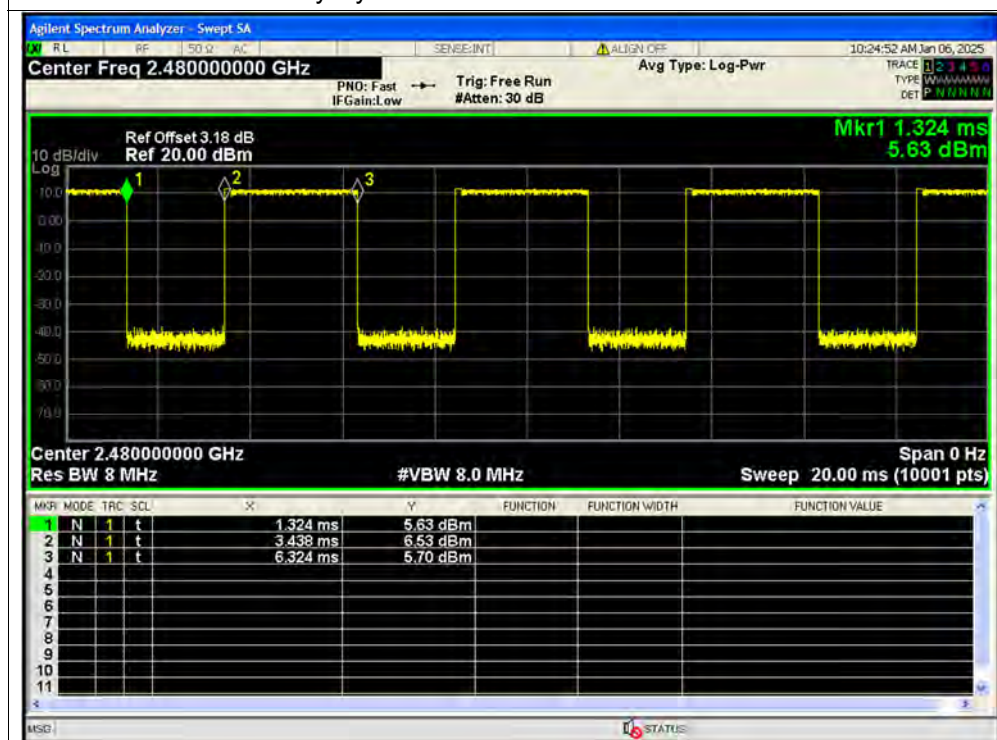
Duty Cycle NVNT 2-DH5 2402MHz Ant1



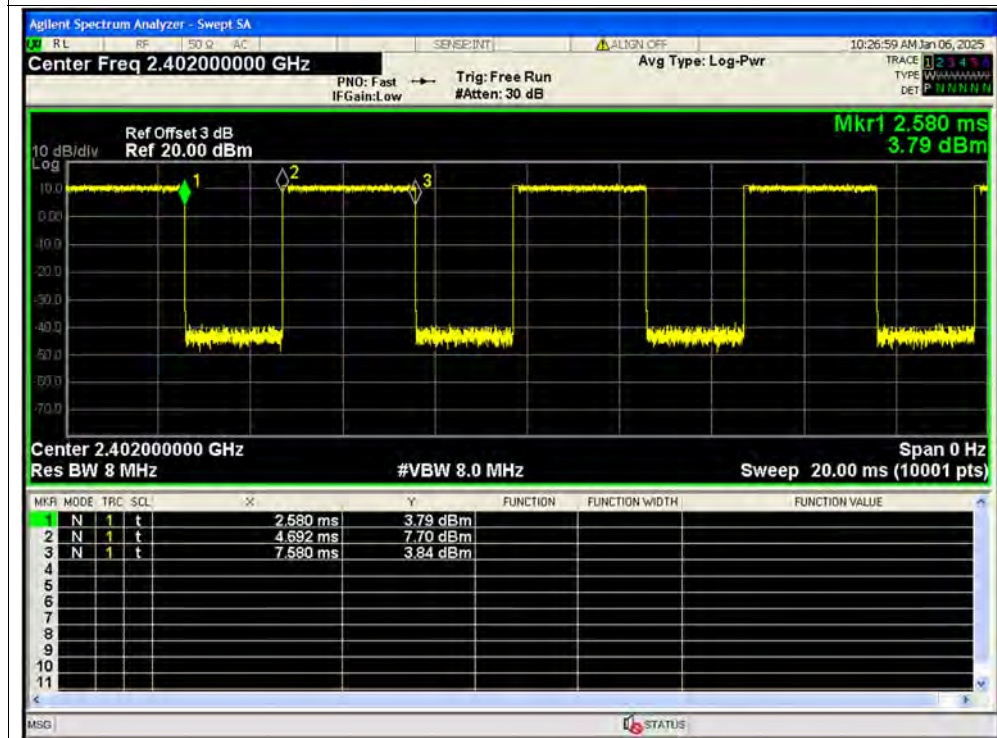
Duty Cycle NVNT 2-DH5 2441MHz Ant1



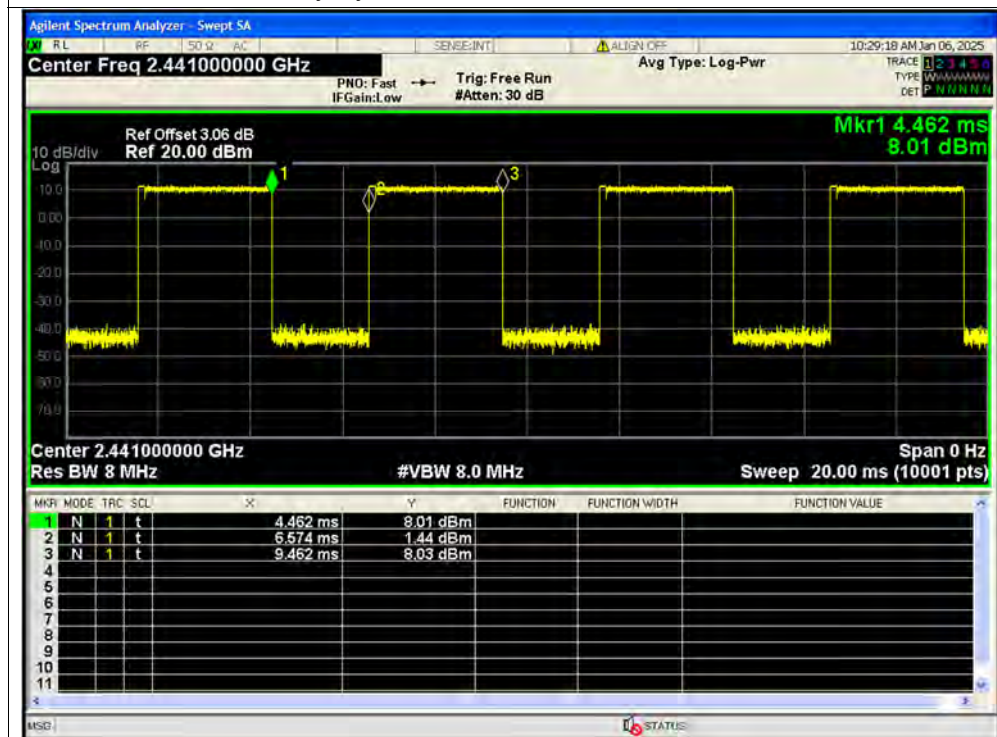
Duty Cycle NVNT 2-DH5 2480MHz Ant1



Duty Cycle NVNT 3-DH5 2402MHz Ant1

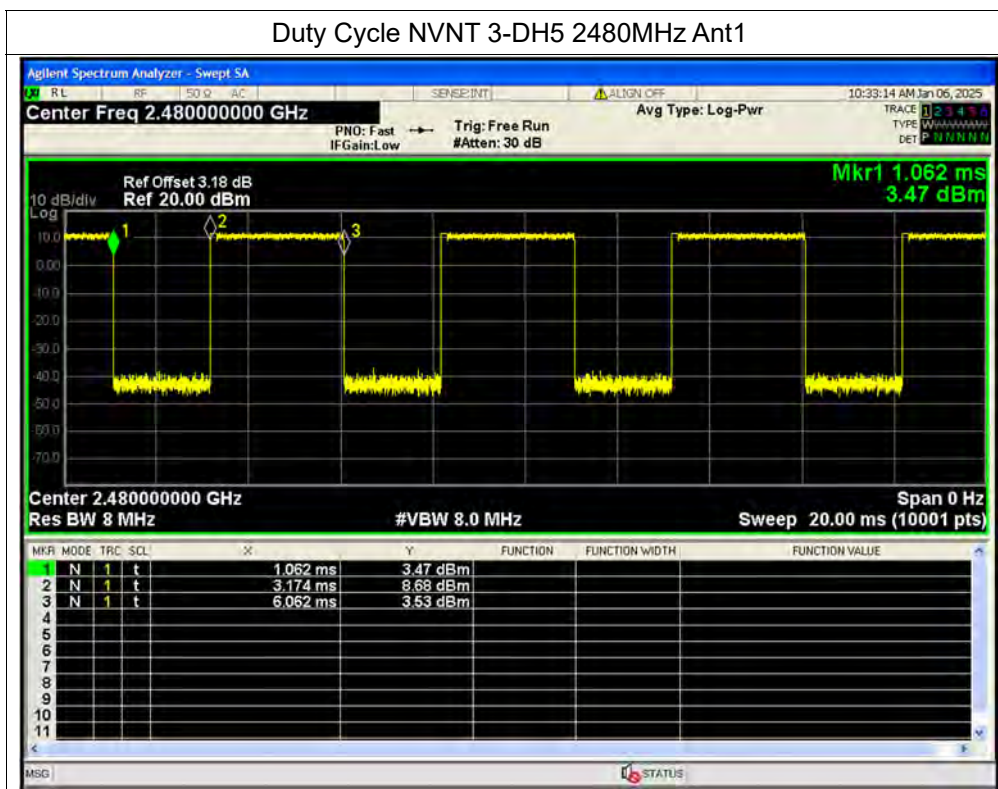


Duty Cycle NVNT 3-DH5 2441MHz Ant1





Duty Cycle NVNT 3-DH5 2480MHz Ant1



**A.3. Maximum Peak Conducted Output Power**

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Duty Factor (dB)	Total Conducted Power (dBm)	Total Conducted Power (W)	Limit Conducted (dBm)	Verdict
NVNT	1-DH5	2402	Ant1	11.26	0	11.26	0.01337	30	Pass
NVNT	1-DH5	2441	Ant1	11.62	0	11.62	0.01452	30	Pass
NVNT	1-DH5	2480	Ant1	11.49	0	11.49	0.01409	30	Pass
NVNT	2-DH5	2402	Ant1	11.24	0	11.24	0.0133	30	Pass
NVNT	2-DH5	2441	Ant1	11.34	0	11.34	0.01361	30	Pass
NVNT	2-DH5	2480	Ant1	11.48	0	11.48	0.01406	30	Pass
NVNT	3-DH5	2402	Ant1	11.29	0	11.29	0.01346	30	Pass
NVNT	3-DH5	2441	Ant1	11.61	0	11.61	0.01449	30	Pass
NVNT	3-DH5	2480	Ant1	11.6	0	11.6	0.01445	30	Pass

Test Graphs

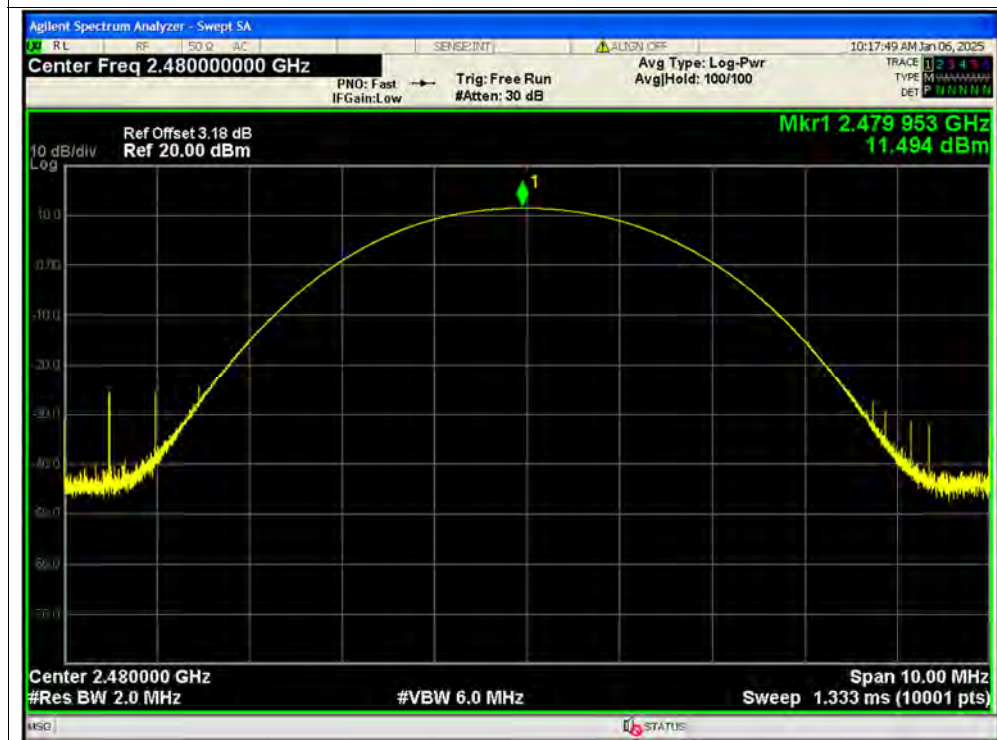
Peak Power NVNT 1-DH5 2402MHz Ant1



Peak Power NVNT 1-DH5 2441MHz Ant1



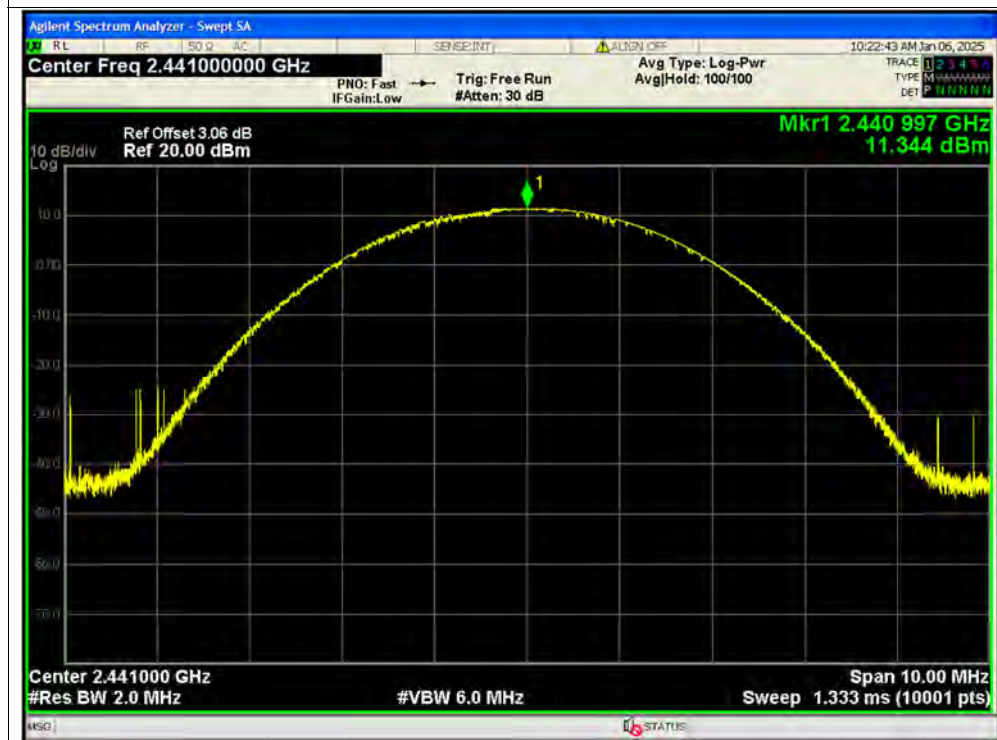
Peak Power NVNT 1-DH5 2480MHz Ant1



Peak Power NVNT 2-DH5 2402MHz Ant1



Peak Power NVNT 2-DH5 2441MHz Ant1



Peak Power NVNT 2-DH5 2480MHz Ant1



Peak Power NVNT 3-DH5 2402MHz Ant1



Peak Power NVNT 3-DH5 2441MHz Ant1





Peak Power NVNT 3-DH5 2480MHz Ant1



**A.4. Maximum Average Conducted Output Power**

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Duty Factor (dB)	Total Conducted Power (dBm)	Total Conducted Power (W)	Limit Conducted (dBm)	Verdict
NVNT	1-DH5	2402	Ant1	8.48	2.39	10.87	0.01222	30	Pass
NVNT	1-DH5	2441	Ant1	8.32	2.39	10.71	0.01178	30	Pass
NVNT	1-DH5	2480	Ant1	8.62	2.39	11.01	0.01262	30	Pass
NVNT	2-DH5	2402	Ant1	6.12	2.38	8.5	0.00708	30	Pass
NVNT	2-DH5	2441	Ant1	6.16	2.39	8.55	0.00716	30	Pass
NVNT	2-DH5	2480	Ant1	6.46	2.39	8.85	0.00767	30	Pass
NVNT	3-DH5	2402	Ant1	5.58	2.38	7.96	0.00625	30	Pass
NVNT	3-DH5	2441	Ant1	6.03	2.38	8.41	0.00693	30	Pass
NVNT	3-DH5	2480	Ant1	6.1	2.38	8.48	0.00705	30	Pass



Test Graphs

Average Power NVNT 1-DH5 2402MHz Ant1



Average Power NVNT 1-DH5 2441MHz Ant1



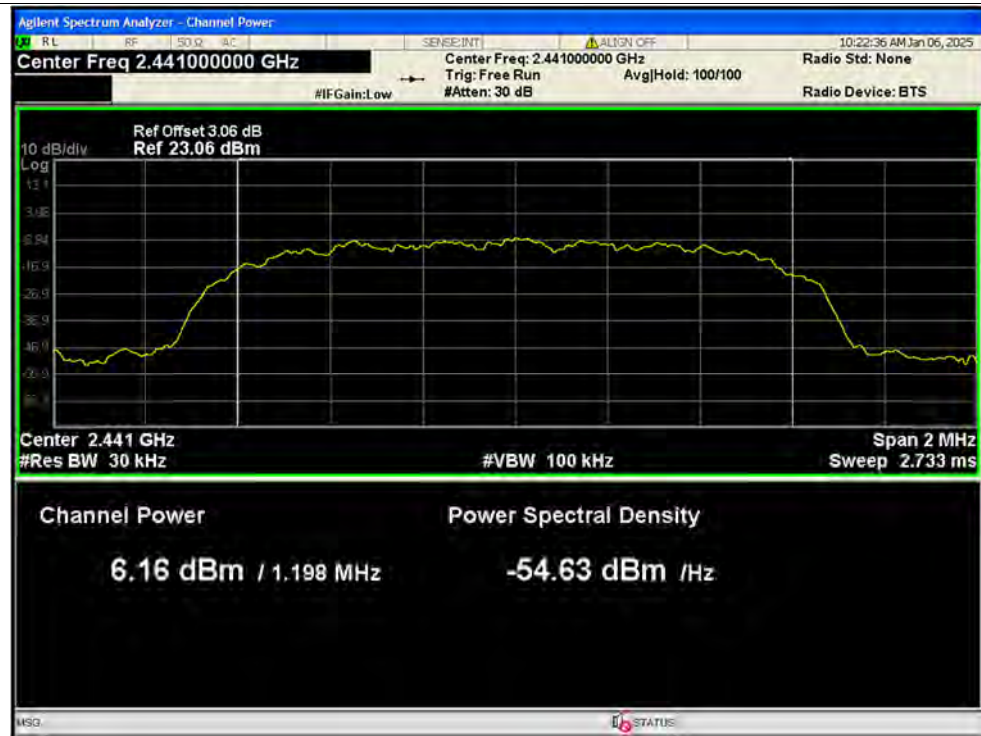
Average Power NVNT 1-DH5 2480MHz Ant1



Average Power NVNT 2-DH5 2402MHz Ant1



Average Power NVNT 2-DH5 2441MHz Ant1

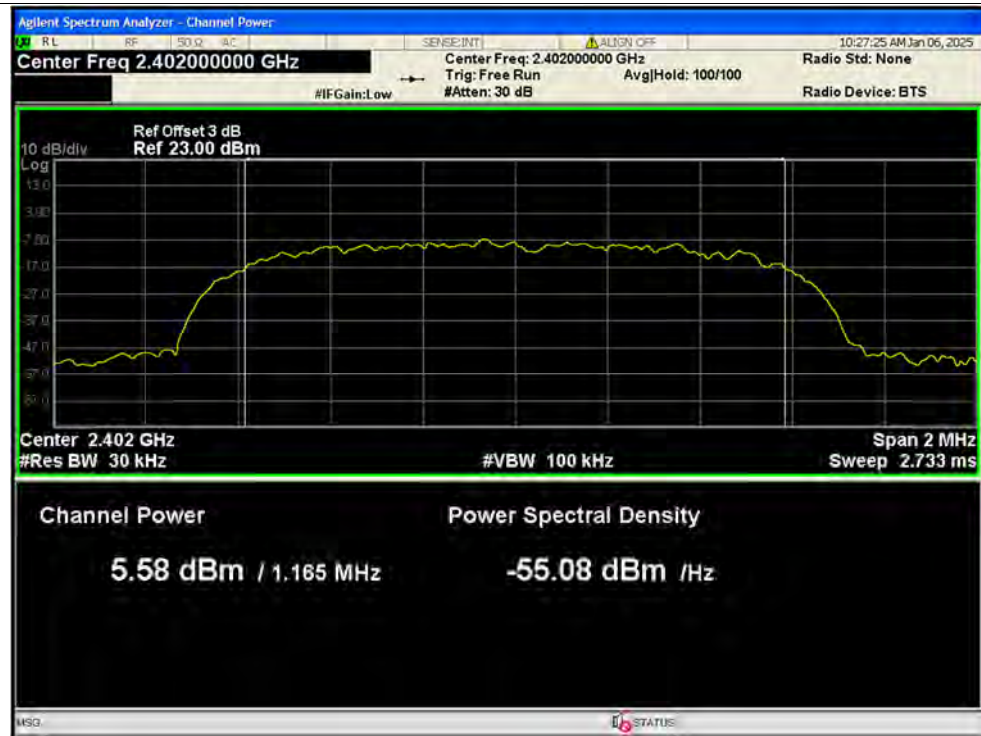


Average Power NVNT 2-DH5 2480MHz Ant1

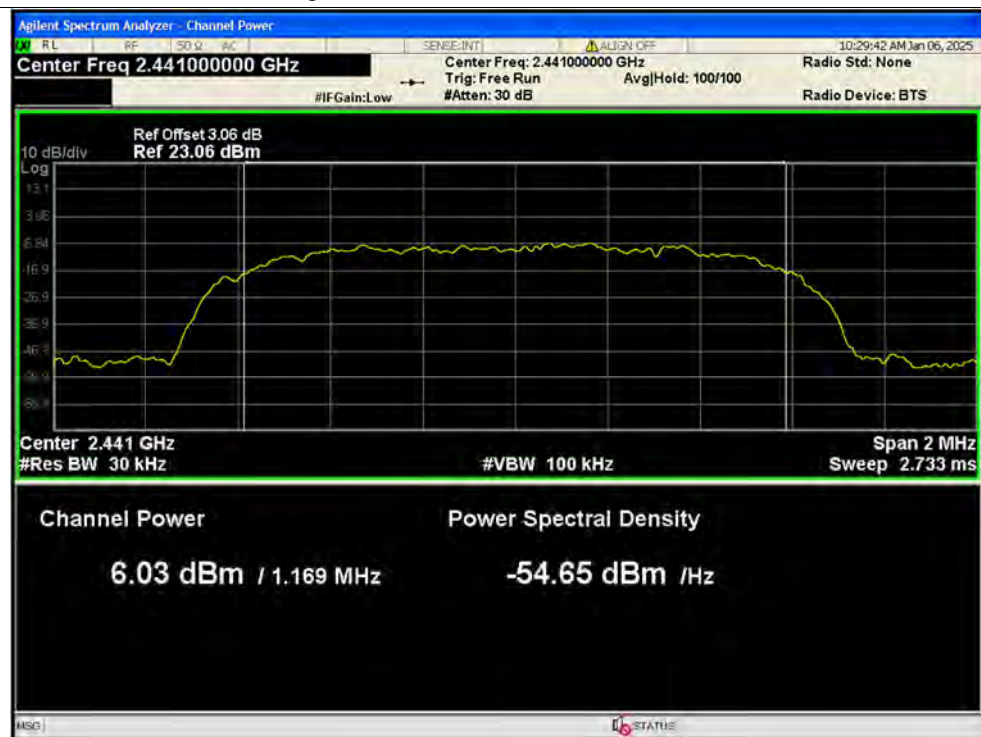




Average Power NVNT 3-DH5 2402MHz Ant1

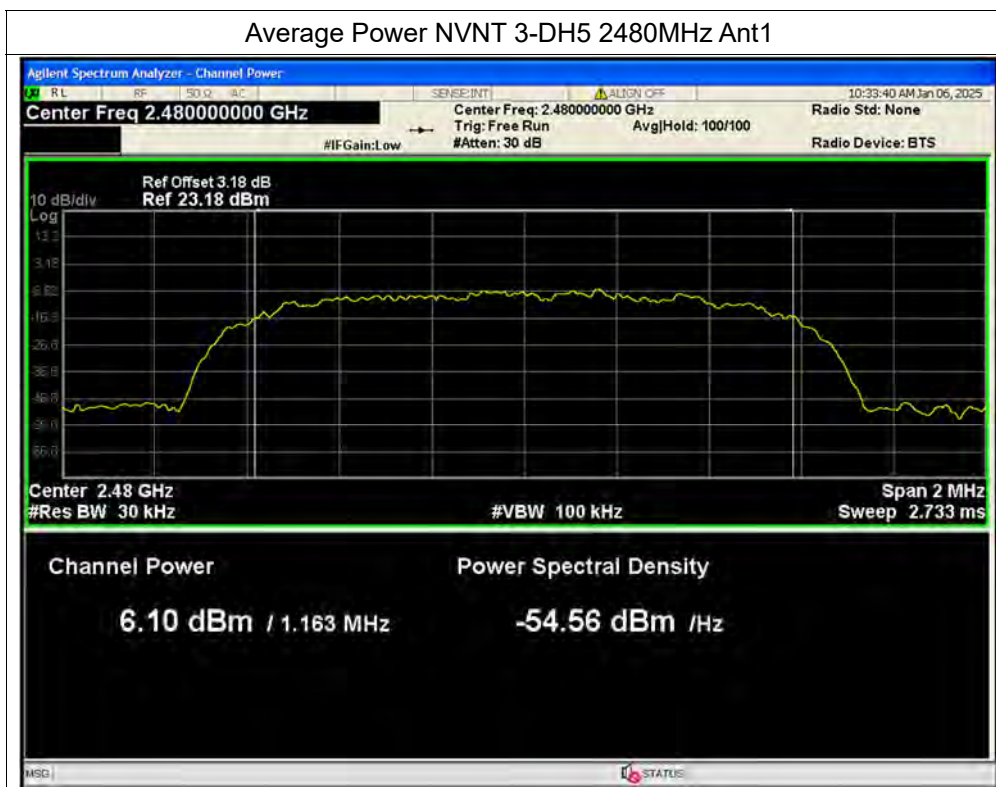


Average Power NVNT 3-DH5 2441MHz Ant1





Average Power NVNT 3-DH5 2480MHz Ant1



**A.5. 20 dB Bandwidth**

Condition	Mode	Frequency (MHz)	Antenna	-20 dB Bandwidth (MHz)
NVNT	1-DH5	2402	Ant1	0.8376
NVNT	1-DH5	2441	Ant1	0.8096
NVNT	1-DH5	2480	Ant1	0.8418
NVNT	2-DH5	2402	Ant1	1.284
NVNT	2-DH5	2441	Ant1	1.278
NVNT	2-DH5	2480	Ant1	1.272
NVNT	3-DH5	2402	Ant1	1.275
NVNT	3-DH5	2441	Ant1	1.255
NVNT	3-DH5	2480	Ant1	1.275

Test Graphs

-20dB Bandwidth NVNT 1-DH5 2402MHz Ant1



-20dB Bandwidth NVNT 1-DH5 2441MHz Ant1



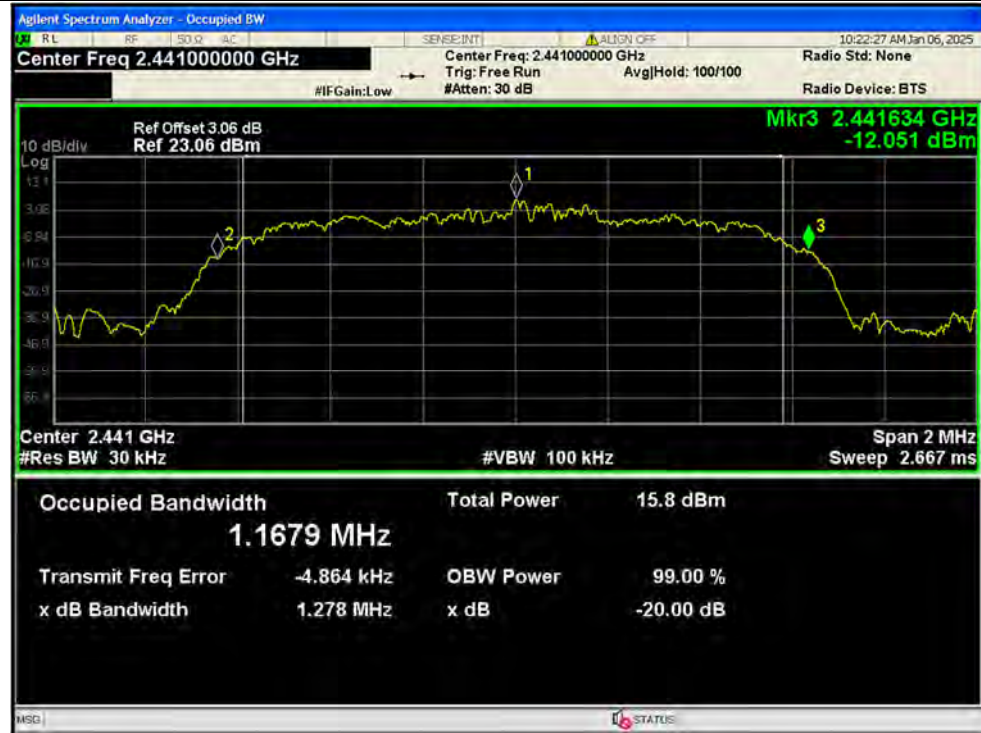
-20dB Bandwidth NVNT 1-DH5 2480MHz Ant1



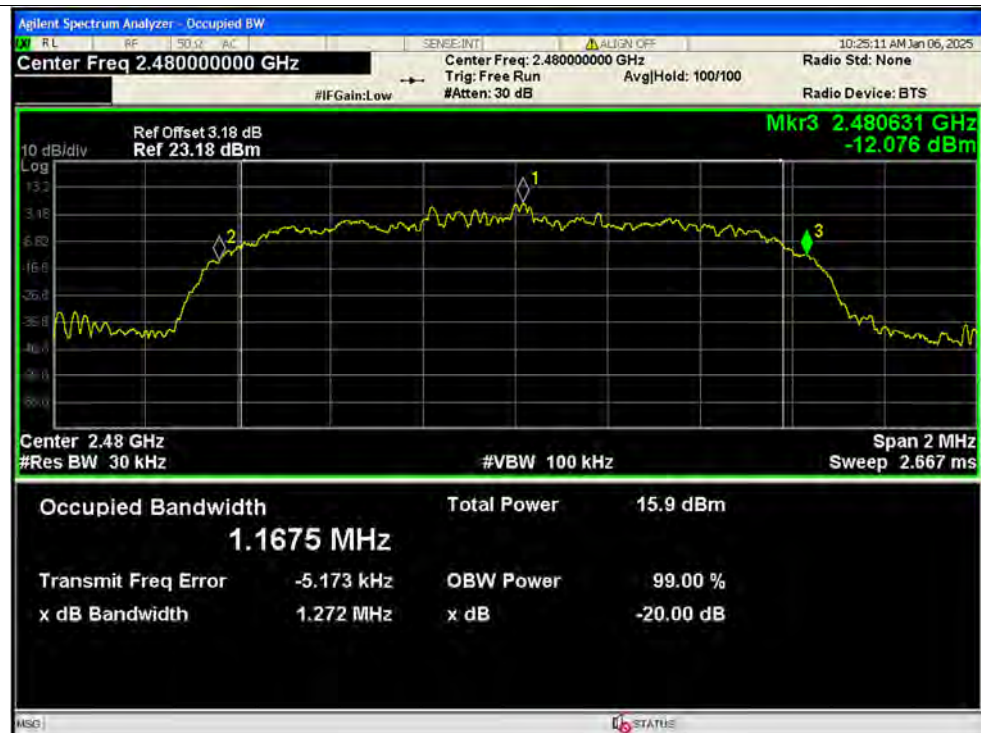
-20dB Bandwidth NVNT 2-DH5 2402MHz Ant1



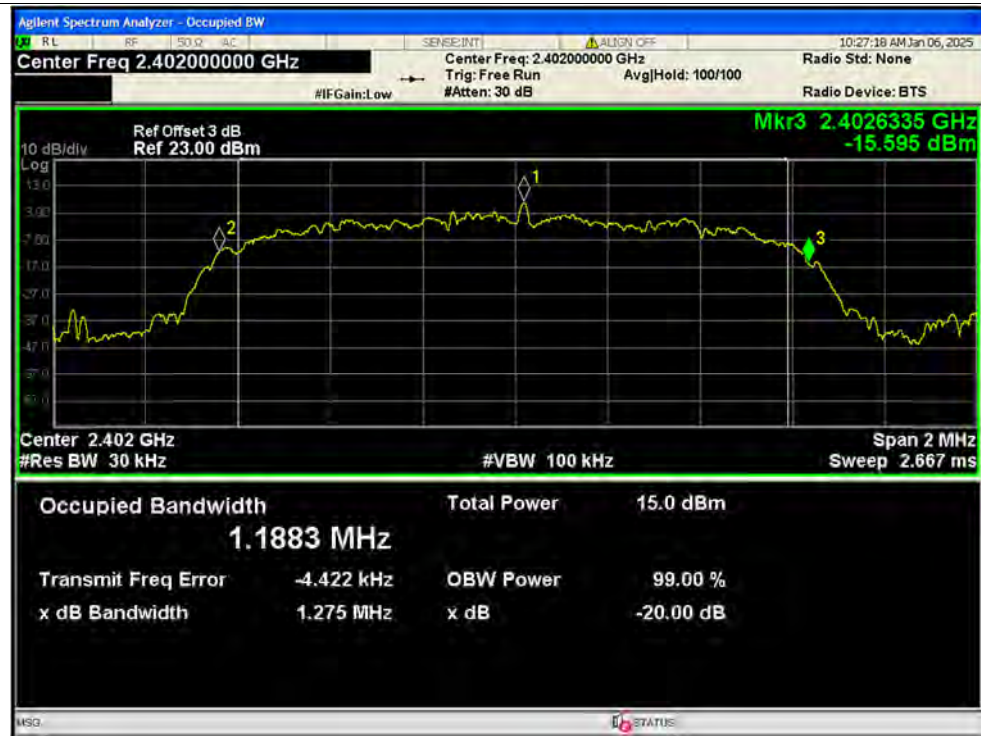
-20dB Bandwidth NVNT 2-DH5 2441MHz Ant1



-20dB Bandwidth NVNT 2-DH5 2480MHz Ant1

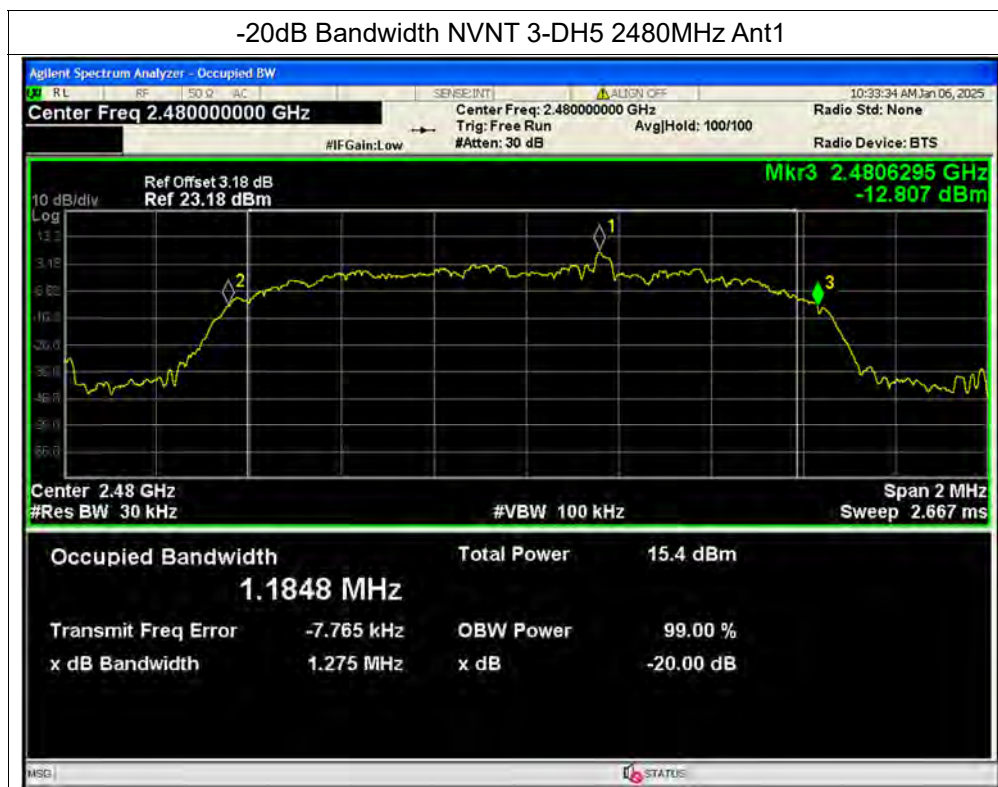


-20dB Bandwidth NVNT 3-DH5 2402MHz Ant1



-20dB Bandwidth NVNT 3-DH5 2441MHz Ant1





**A.6. Carried Frequency Separation**

Condition	Mode	Antenna	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	1-DH5	Ant1	2402.01	2402.96	0.95	0.558	Pass
NVNT	1-DH5	Ant1	2440.978	2441.964	0.986	0.54	Pass
NVNT	1-DH5	Ant1	2478.904	2479.982	1.078	0.561	Pass
NVNT	2-DH5	Ant1	2402.16	2403.04	0.88	0.856	Pass
NVNT	2-DH5	Ant1	2441.014	2442.016	1.002	0.852	Pass
NVNT	2-DH5	Ant1	2478.918	2479.906	0.988	0.848	Pass
NVNT	3-DH5	Ant1	2402.166	2403.03	0.864	0.85	Pass
NVNT	3-DH5	Ant1	2441.162	2442.178	1.016	0.837	Pass
NVNT	3-DH5	Ant1	2478.942	2480.006	1.064	0.85	Pass



Test Graphs

CFS NVNT 1-DH5 2402MHz Ant1



CFS NVNT 1-DH5 2441MHz Ant1

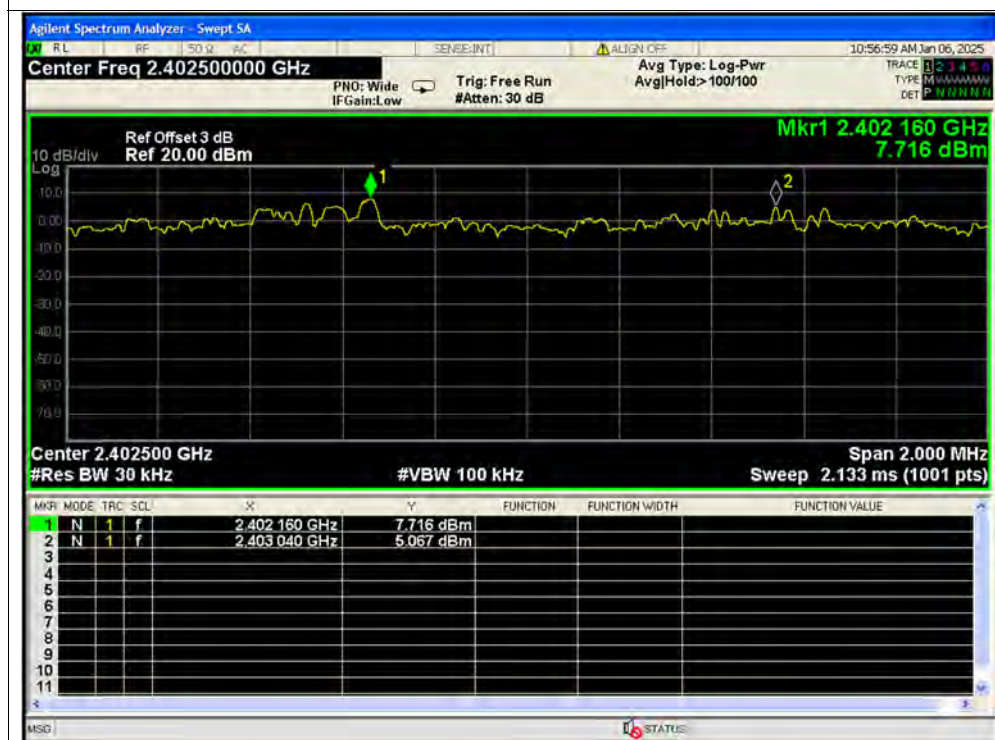




CFS NVNT 1-DH5 2480MHz Ant1

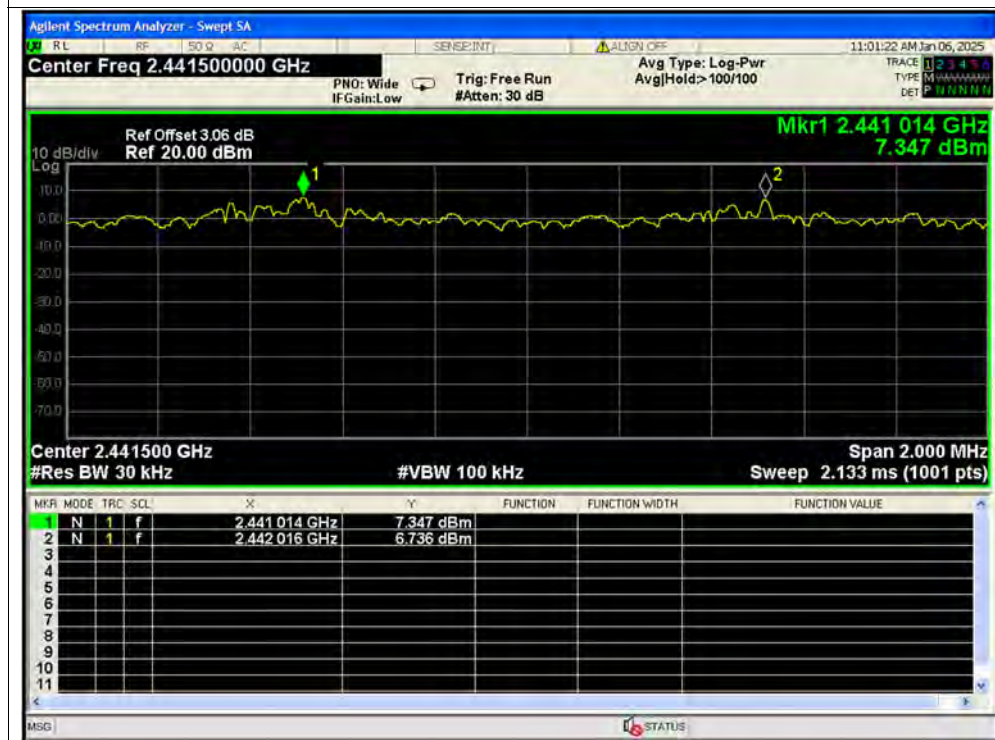


CFS NVNT 2-DH5 2402MHz Ant1

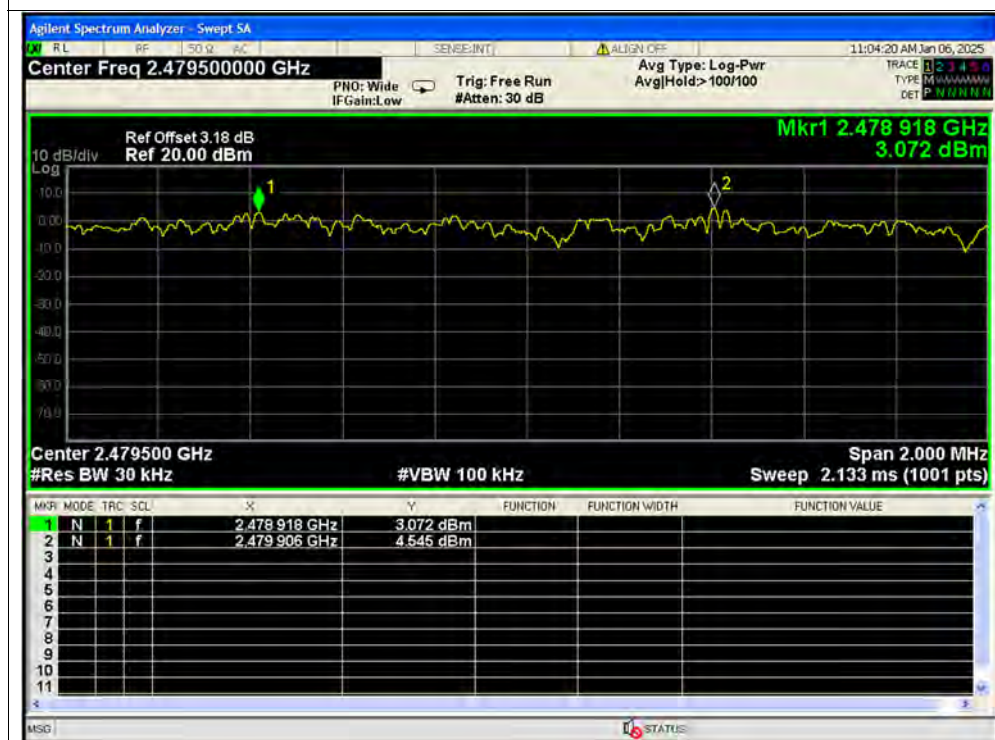




CFS NVNT 2-DH5 2441MHz Ant1

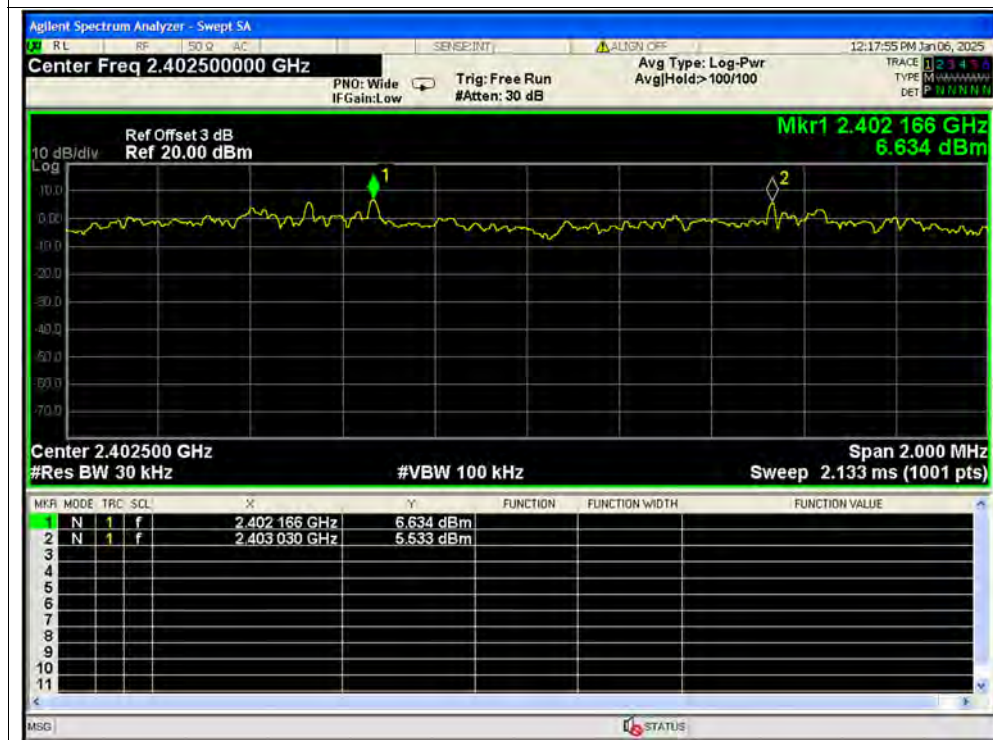


CFS NVNT 2-DH5 2480MHz Ant1

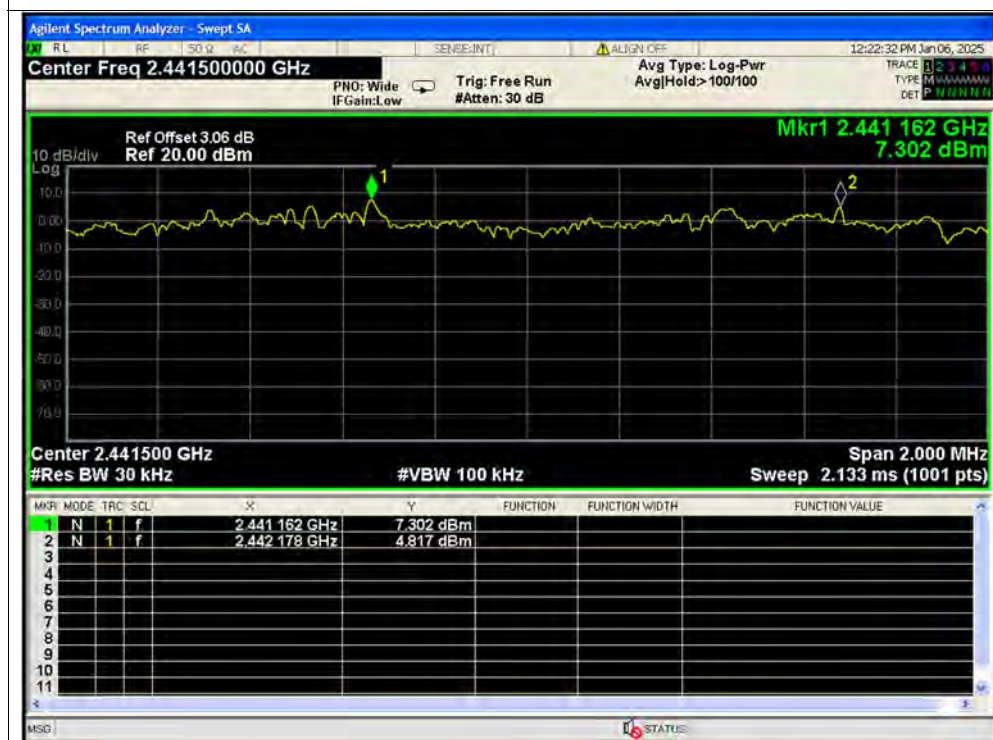




CFS NVNT 3-DH5 2402MHz Ant1

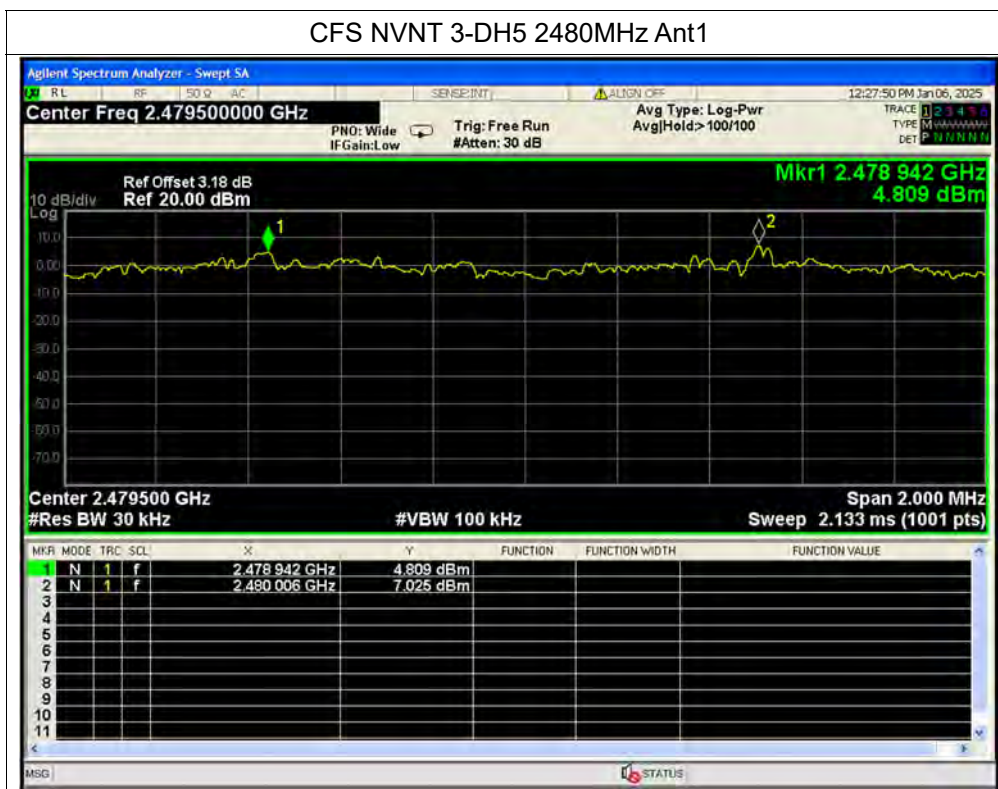


CFS NVNT 3-DH5 2441MHz Ant1





CFS NVNT 3-DH5 2480MHz Ant1

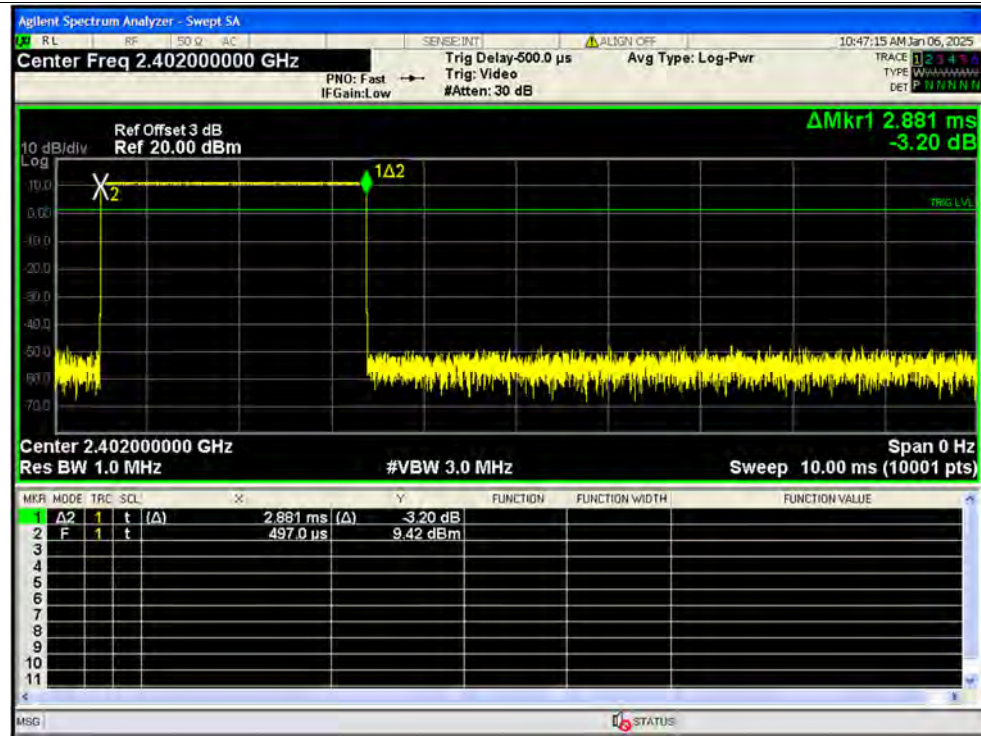


**A.7. Time of Occupancy (Dwell time)**

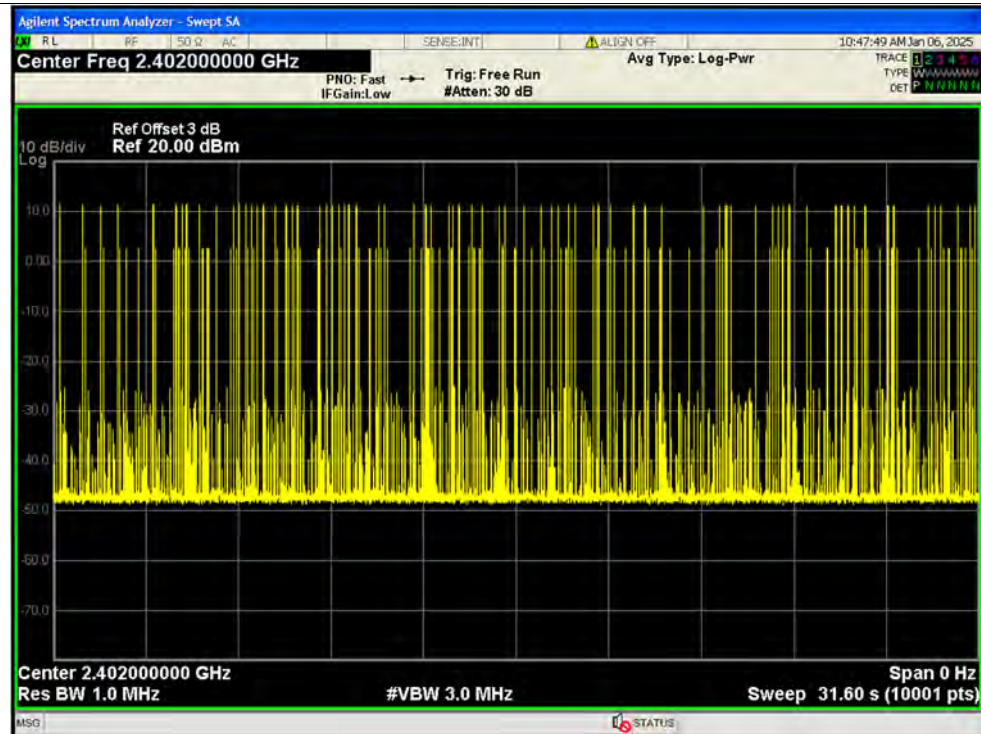
Condition	Mode	Frequency (MHz)	Antenna	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
NVNT	1-DH5	2402	Ant1	2.881	224.718	78	31600	400	Pass
NVNT	1-DH5	2441	Ant1	2.88	244.8	85	31600	400	Pass
NVNT	1-DH5	2480	Ant1	2.881	218.956	76	31600	400	Pass
NVNT	2-DH5	2402	Ant1	2.884	207.648	72	31600	400	Pass
NVNT	2-DH5	2441	Ant1	2.884	213.416	74	31600	400	Pass
NVNT	2-DH5	2480	Ant1	2.883	224.874	78	31600	400	Pass
NVNT	3-DH5	2402	Ant1	2.886	213.564	74	31600	400	Pass
NVNT	3-DH5	2441	Ant1	2.881	213.194	74	31600	400	Pass
NVNT	3-DH5	2480	Ant1	2.886	225.108	78	31600	400	Pass

Test Graphs

Dwell NVNT 1-DH5 2402MHz Ant1 One Burst

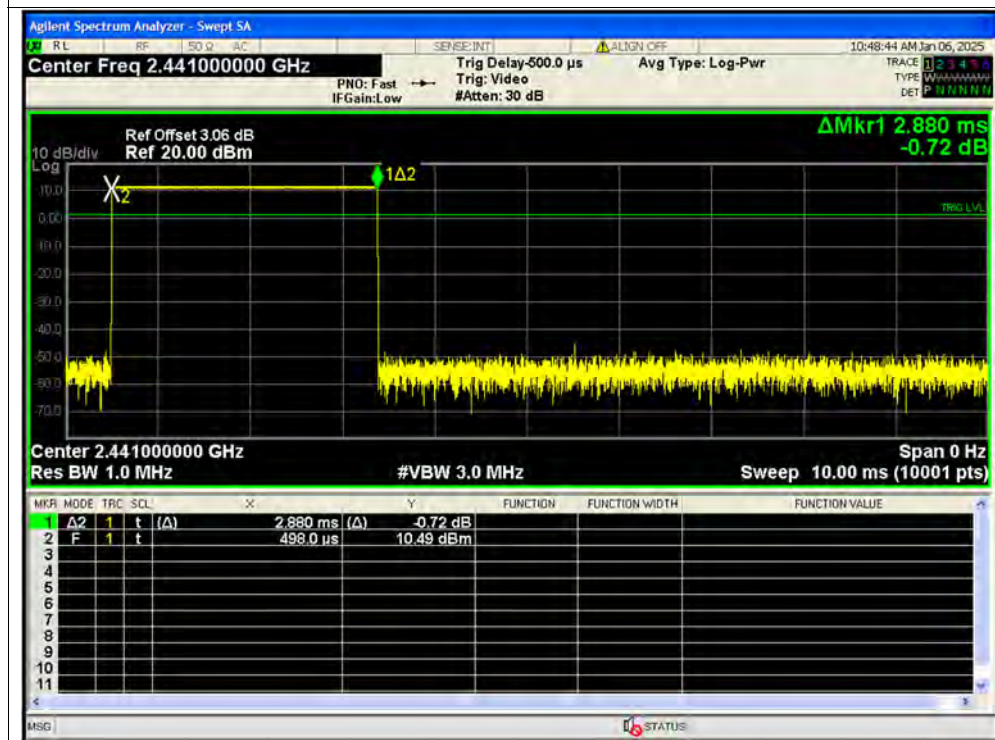


Dwell NVNT 1-DH5 2402MHz Ant1 Accumulated

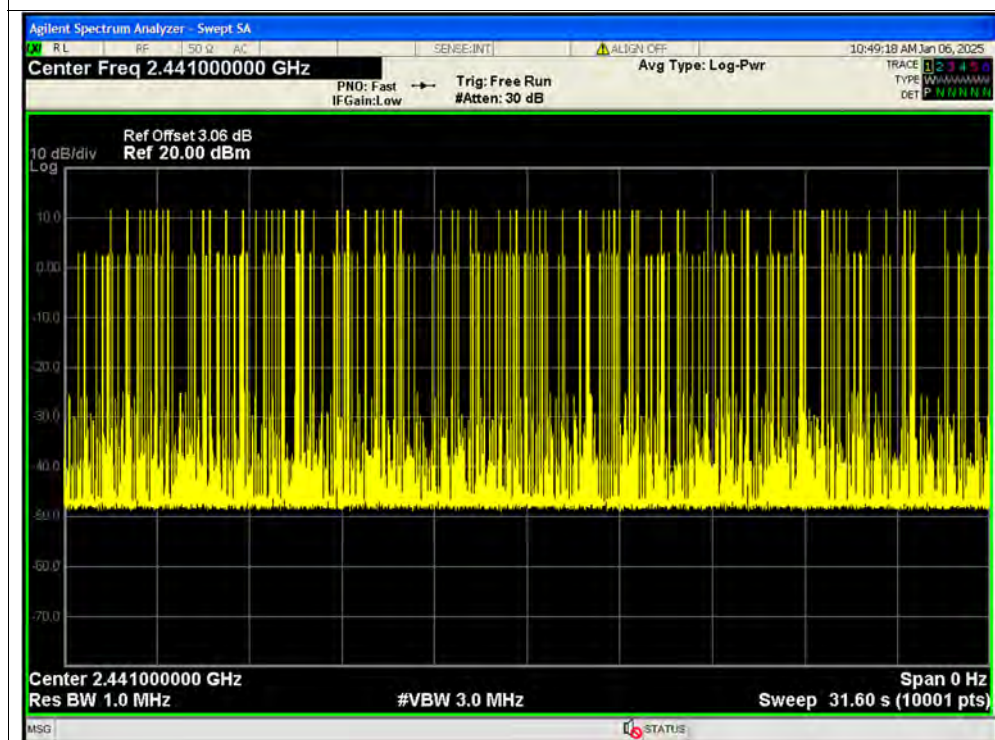




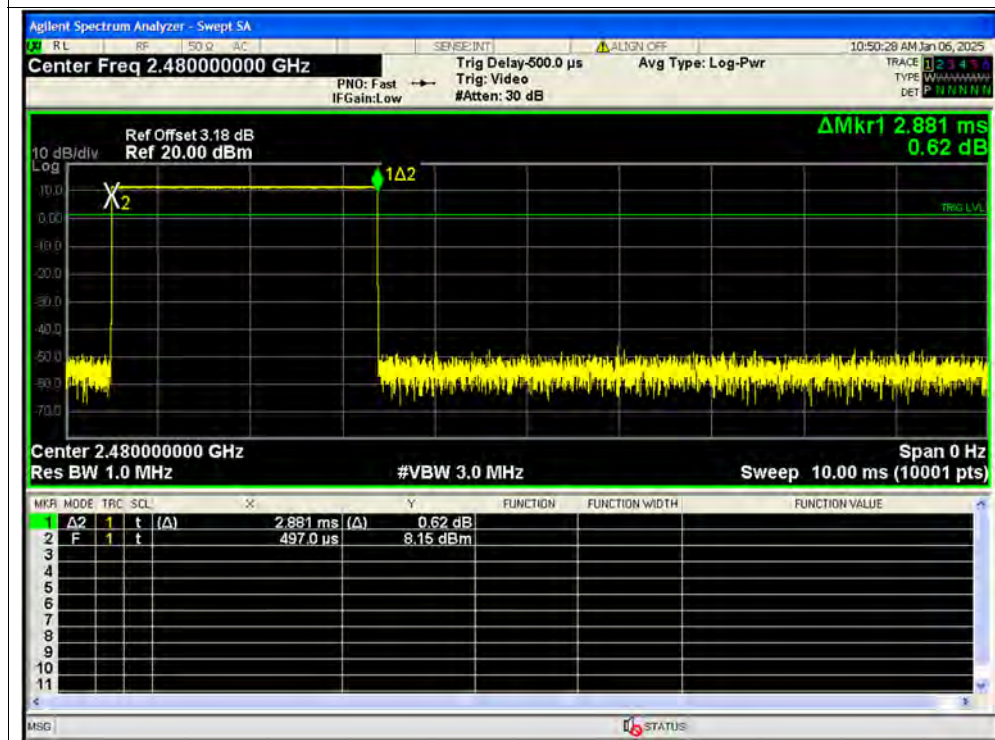
Dwell NVNT 1-DH5 2441MHz Ant1 One Burst



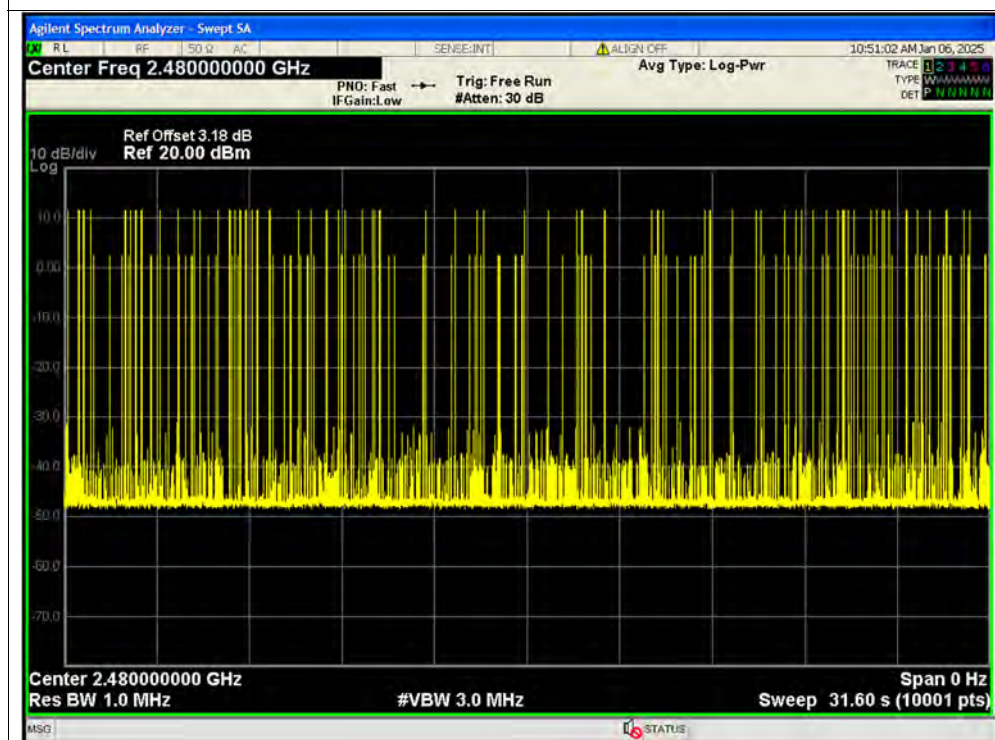
Dwell NVNT 1-DH5 2441MHz Ant1 Accumulated



Dwell NVNT 1-DH5 2480MHz Ant1 One Burst

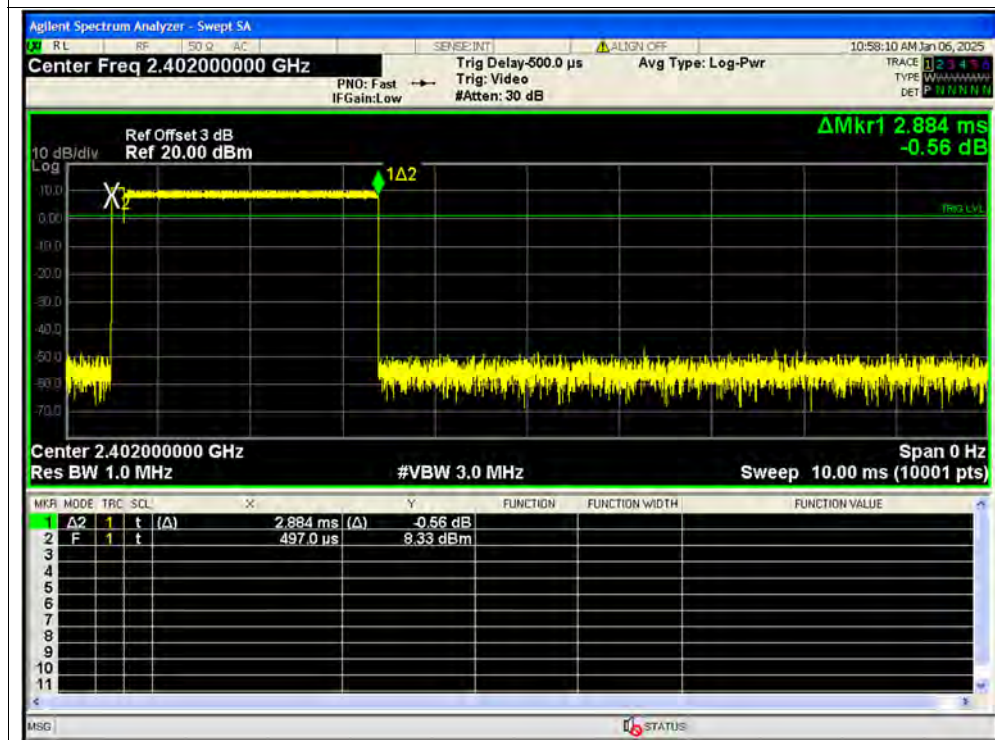


Dwell NVNT 1-DH5 2480MHz Ant1 Accumulated

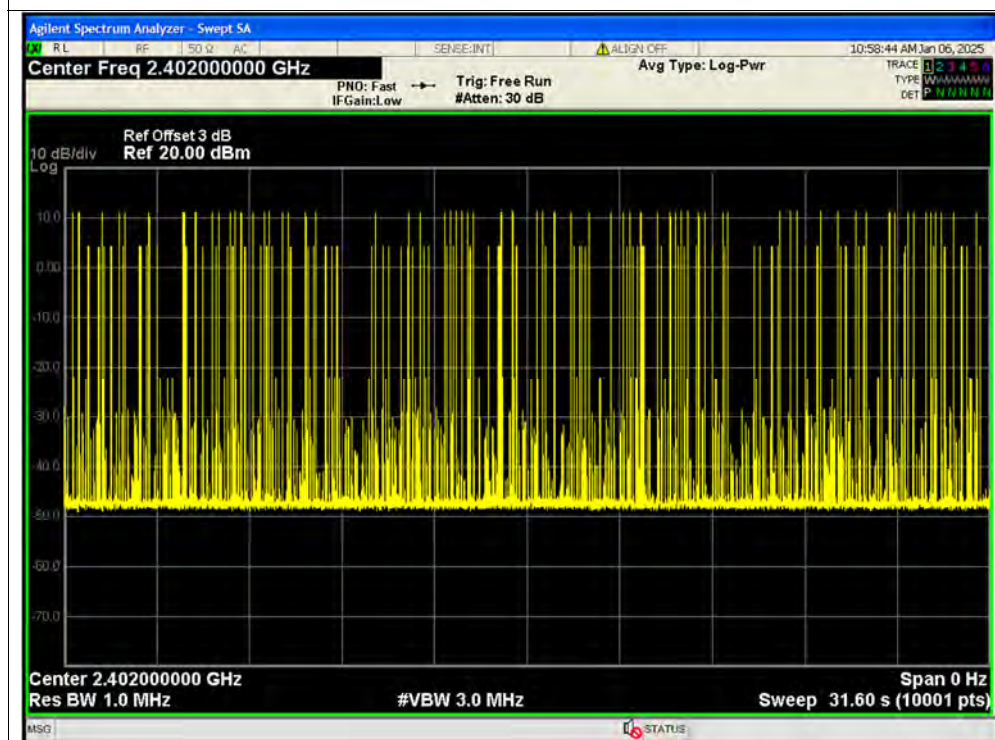




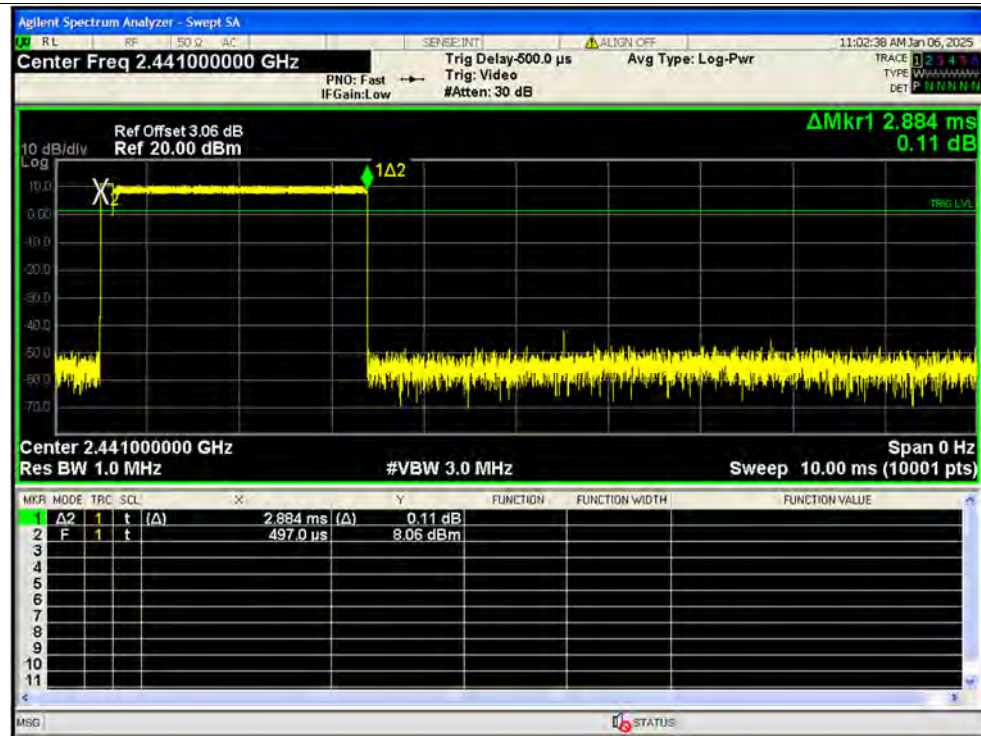
Dwell NVNT 2-DH5 2402MHz Ant1 One Burst



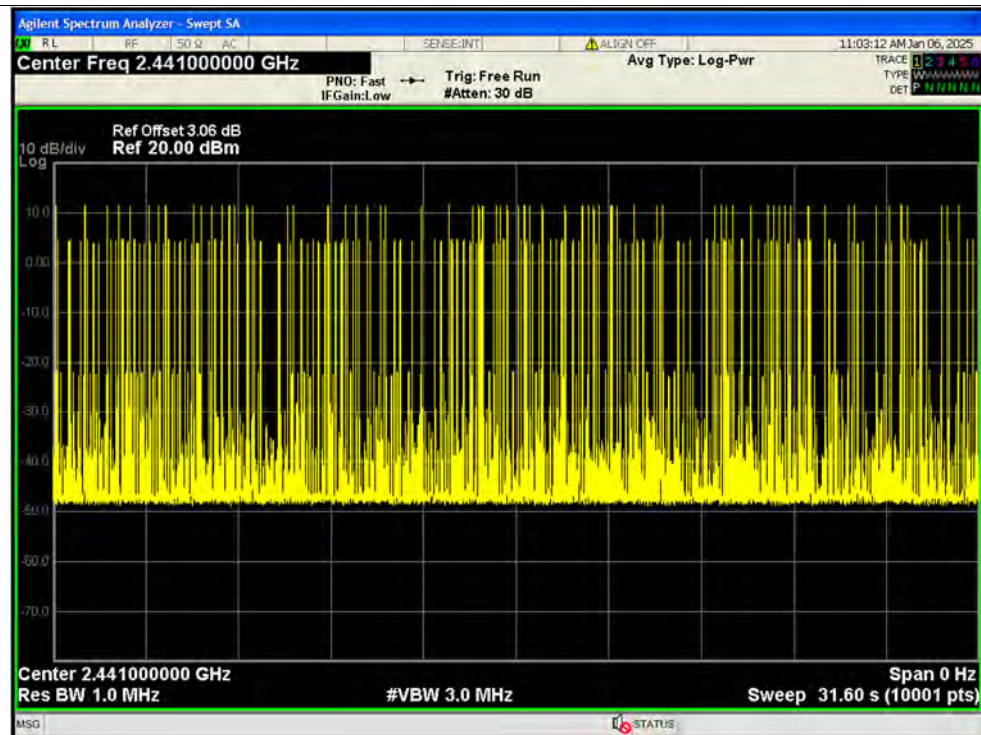
Dwell NVNT 2-DH5 2402MHz Ant1 Accumulated



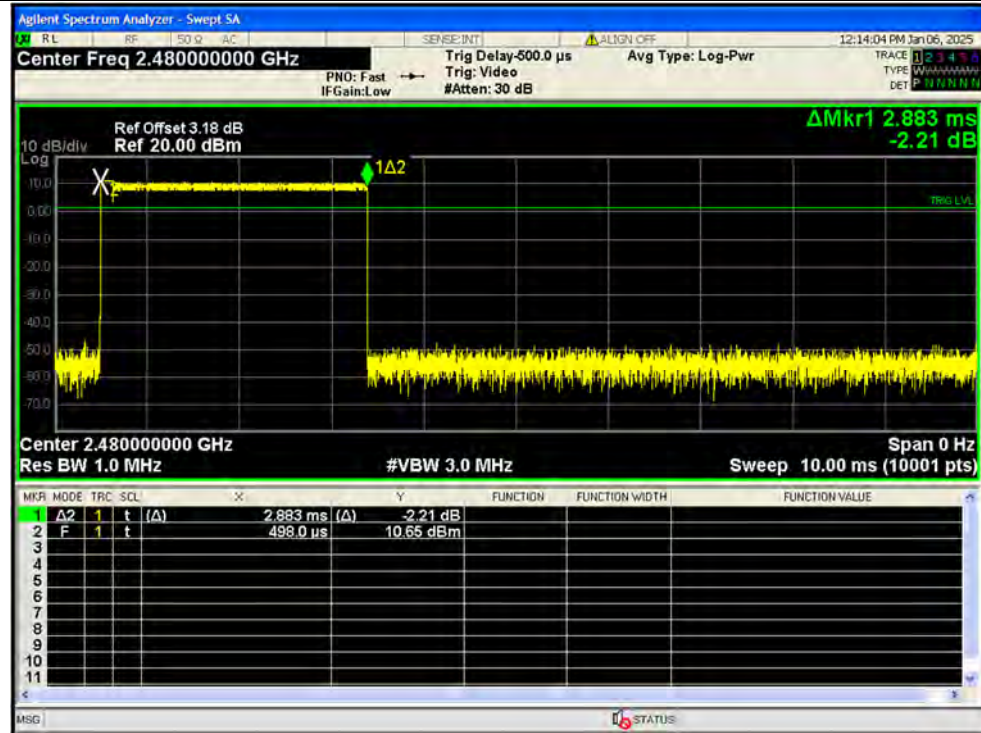
Dwell NVNT 2-DH5 2441MHz Ant1 One Burst



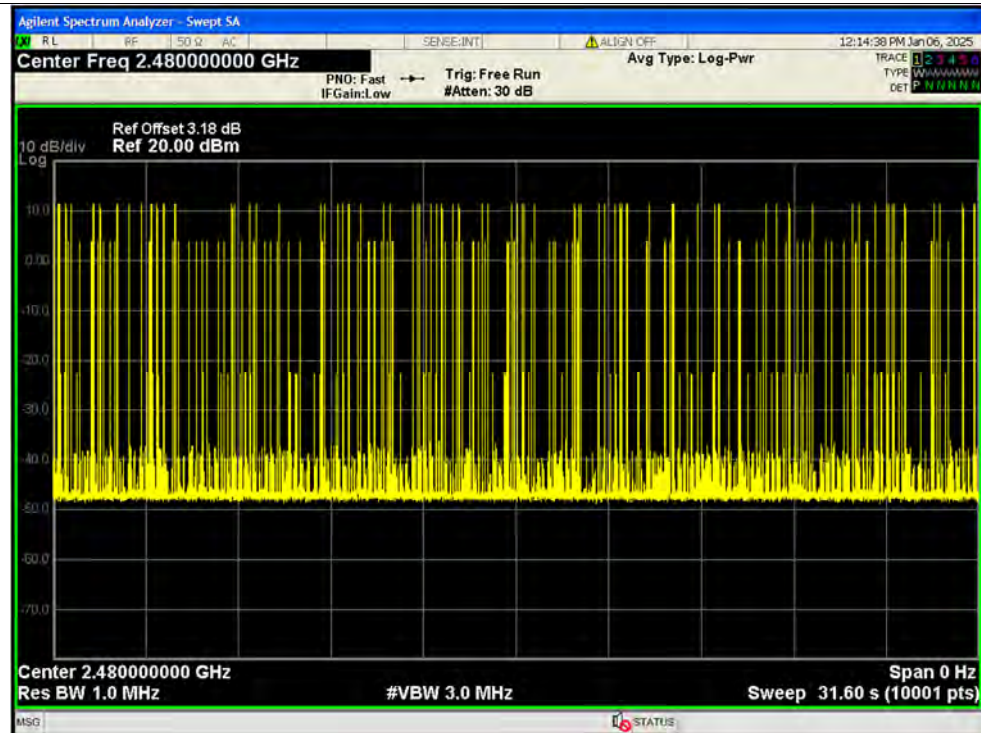
Dwell NVNT 2-DH5 2441MHz Ant1 Accumulated



Dwell NVNT 2-DH5 2480MHz Ant1 One Burst

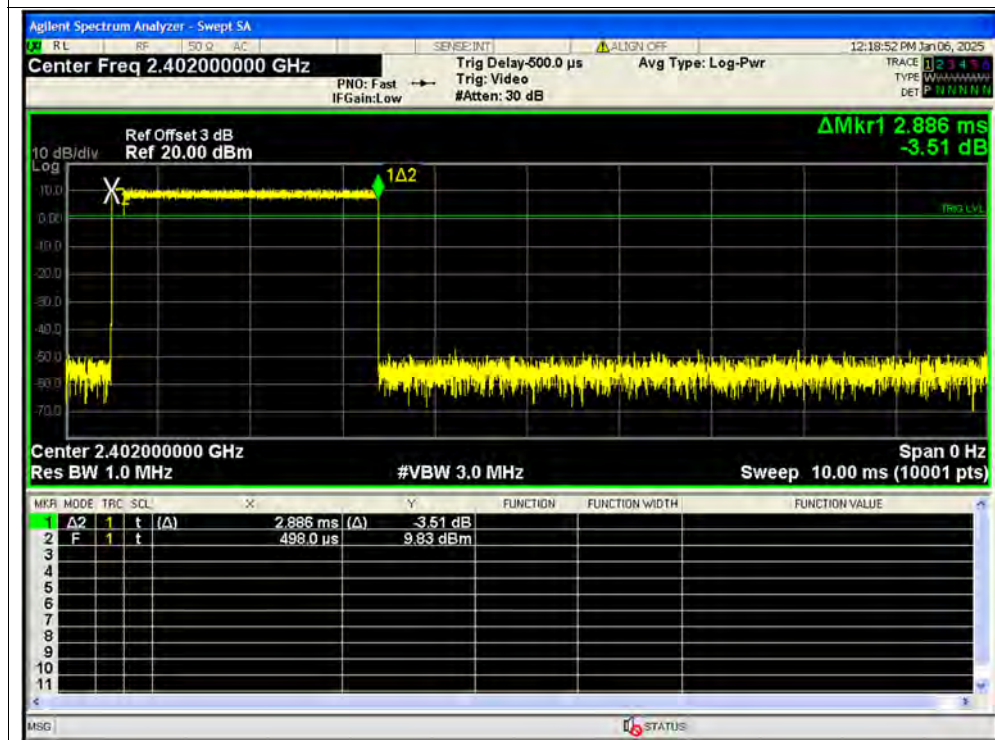


Dwell NVNT 2-DH5 2480MHz Ant1 Accumulated

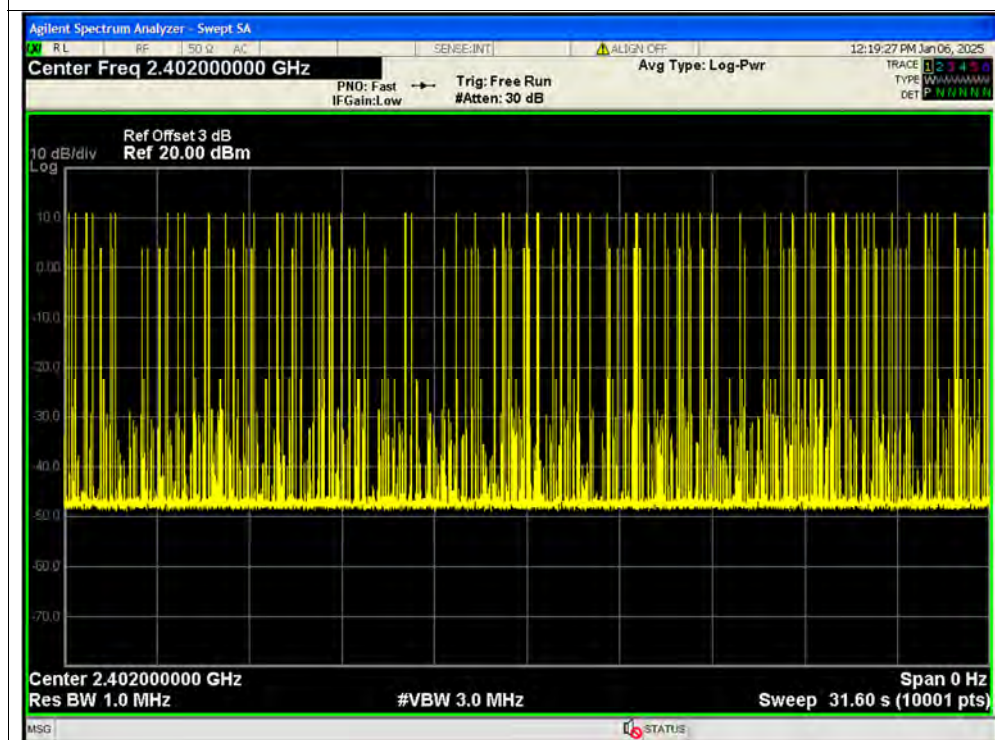




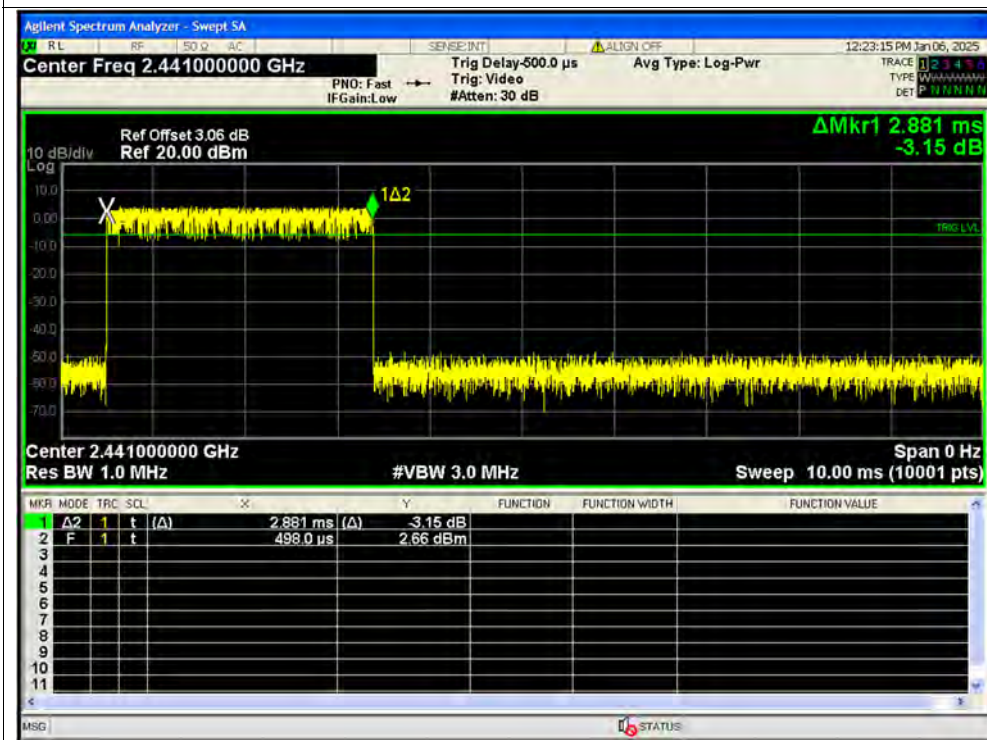
Dwell NVNT 3-DH5 2402MHz Ant1 One Burst



Dwell NVNT 3-DH5 2402MHz Ant1 Accumulated



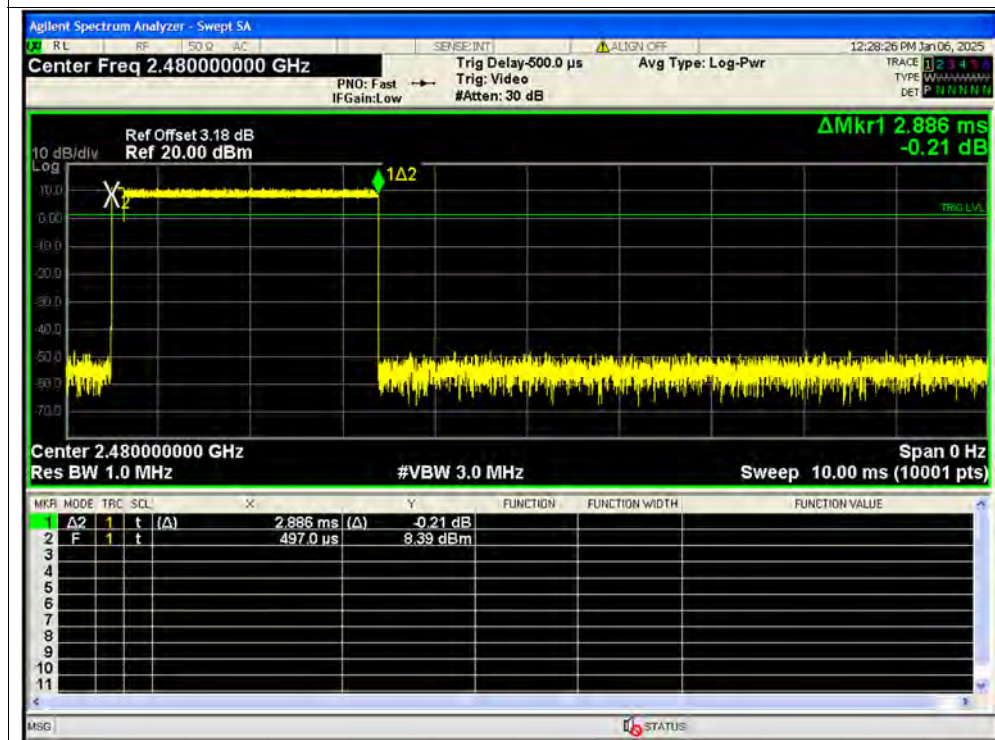
Dwell NVNT 3-DH5 2441MHz Ant1 One Burst



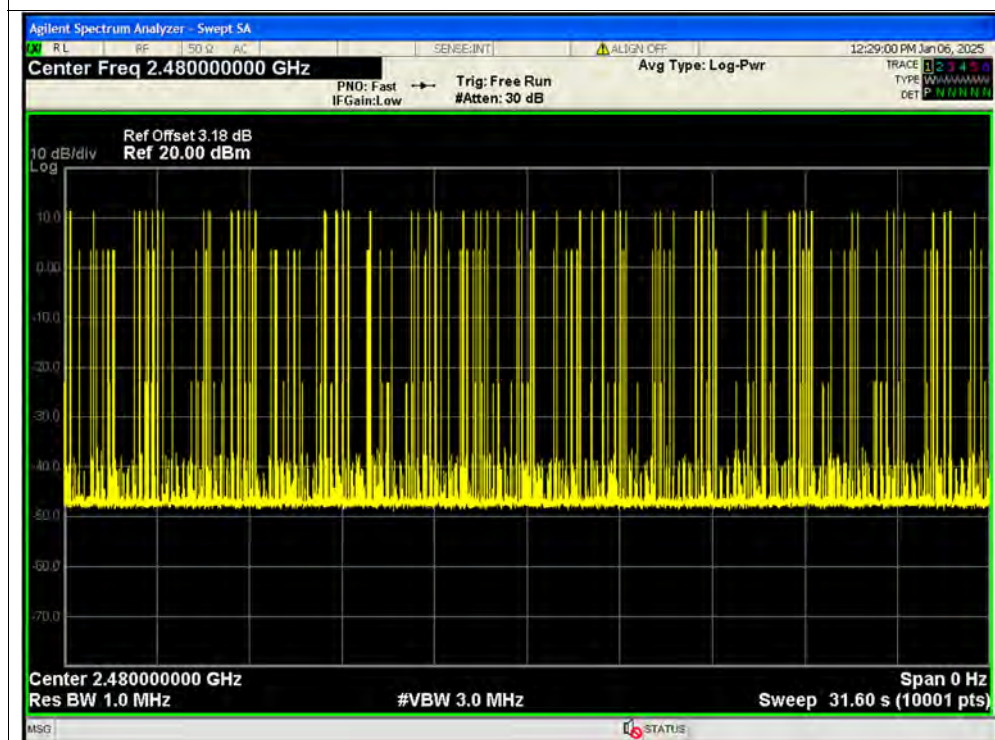
Dwell NVNT 3-DH5 2441MHz Ant1 Accumulated



Dwell NVNT 3-DH5 2480MHz Ant1 One Burst



Dwell NVNT 3-DH5 2480MHz Ant1 Accumulated



**A.8. Conducted Spurious Emissions**

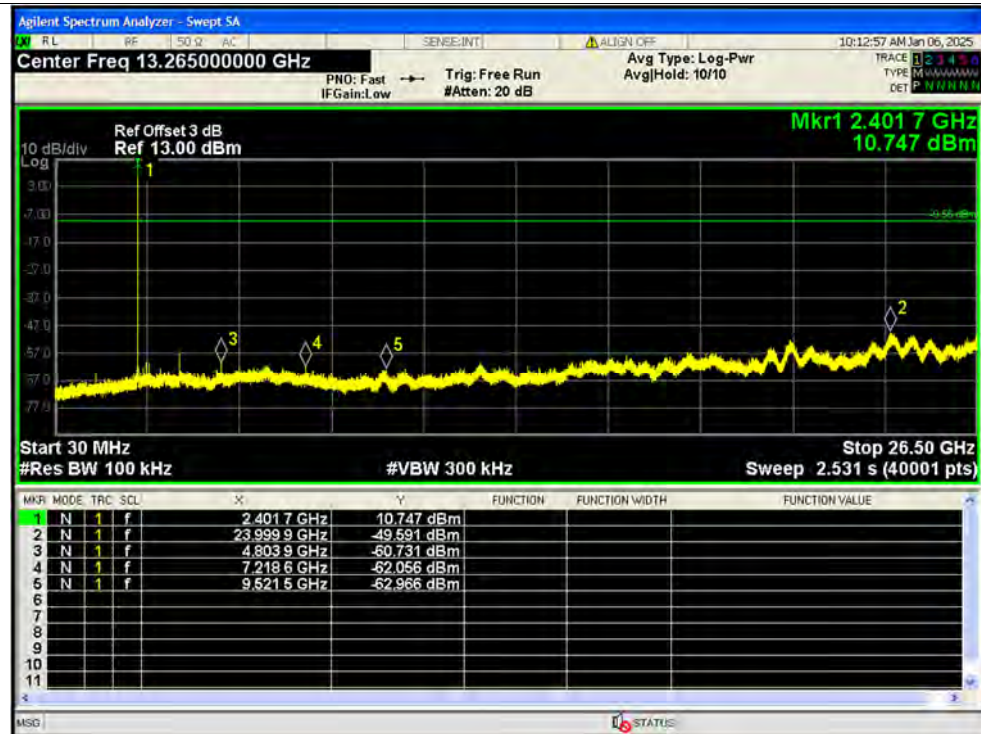
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	1-DH5	2402	Ant1	-60.03	-20	Pass
NVNT	1-DH5	2441	Ant1	-60.13	-20	Pass
NVNT	1-DH5	2480	Ant1	-60.39	-20	Pass
NVNT	2-DH5	2402	Ant1	-59.43	-20	Pass
NVNT	2-DH5	2441	Ant1	-60.3	-20	Pass
NVNT	2-DH5	2480	Ant1	-59.83	-20	Pass
NVNT	3-DH5	2402	Ant1	-59.49	-20	Pass
NVNT	3-DH5	2441	Ant1	-60.82	-20	Pass
NVNT	3-DH5	2480	Ant1	-60.76	-20	Pass

Test Graphs

Tx. Spurious NVNT 1-DH5 2402MHz Ant1 Ref



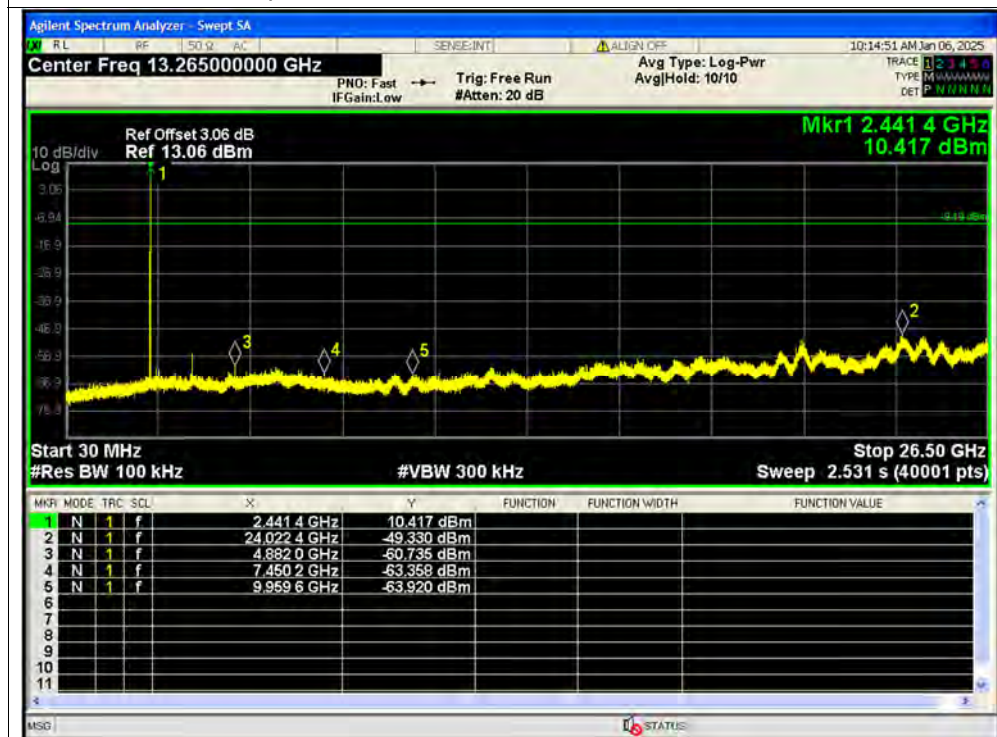
Tx. Spurious NVNT 1-DH5 2402MHz Ant1 Emission



Tx. Spurious NVNT 1-DH5 2441MHz Ant1 Ref



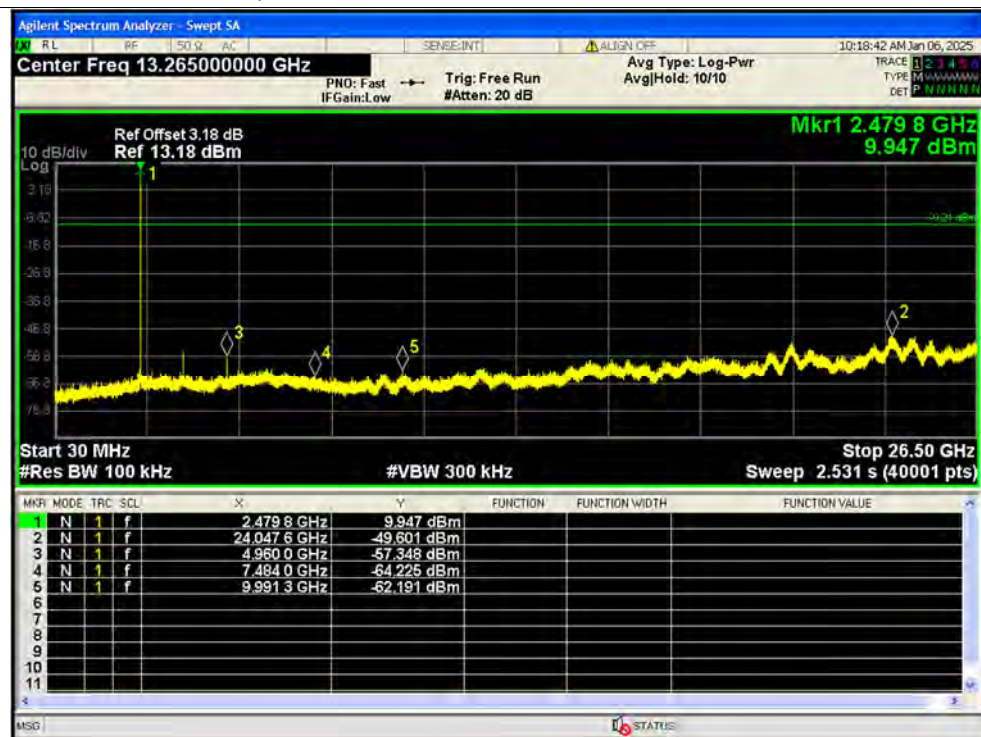
Tx. Spurious NVNT 1-DH5 2441MHz Ant1 Emission



Tx. Spurious NVNT 1-DH5 2480MHz Ant1 Ref



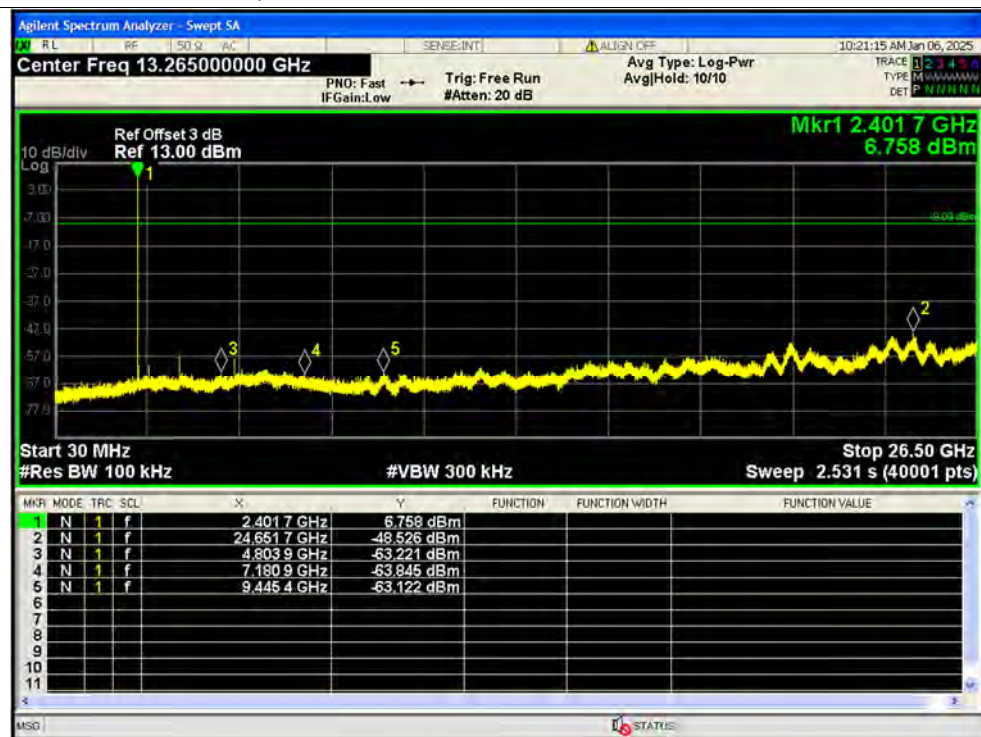
Tx. Spurious NVNT 1-DH5 2480MHz Ant1 Emission



Tx. Spurious NVNT 2-DH5 2402MHz Ant1 Ref



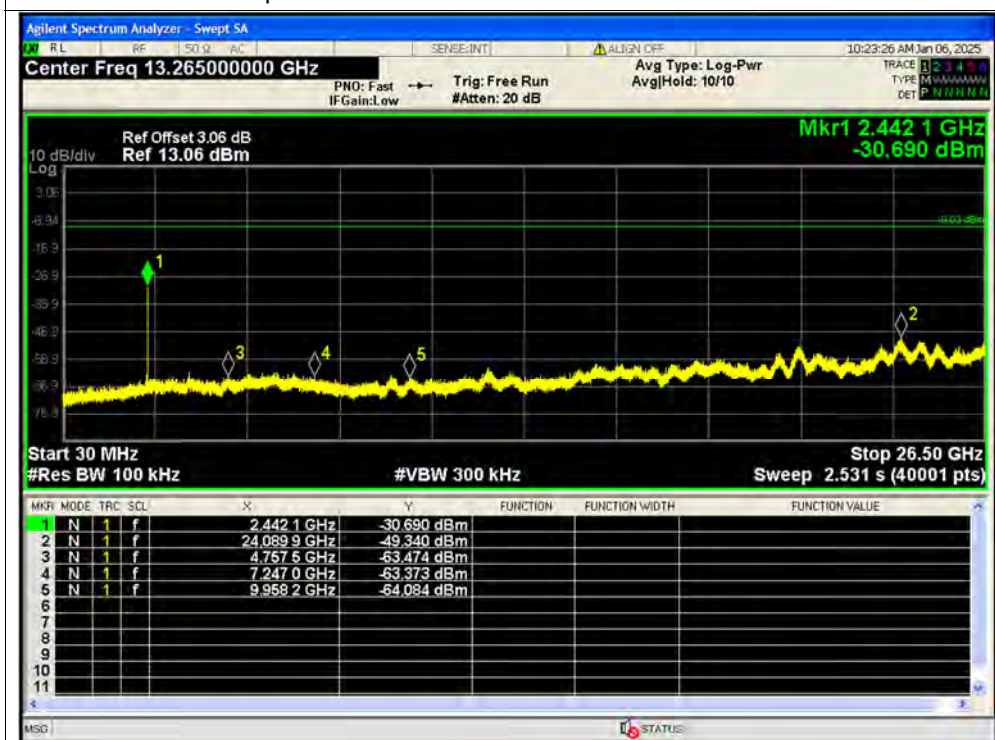
Tx. Spurious NVNT 2-DH5 2402MHz Ant1 Emission



Tx. Spurious NVNT 2-DH5 2441MHz Ant1 Ref



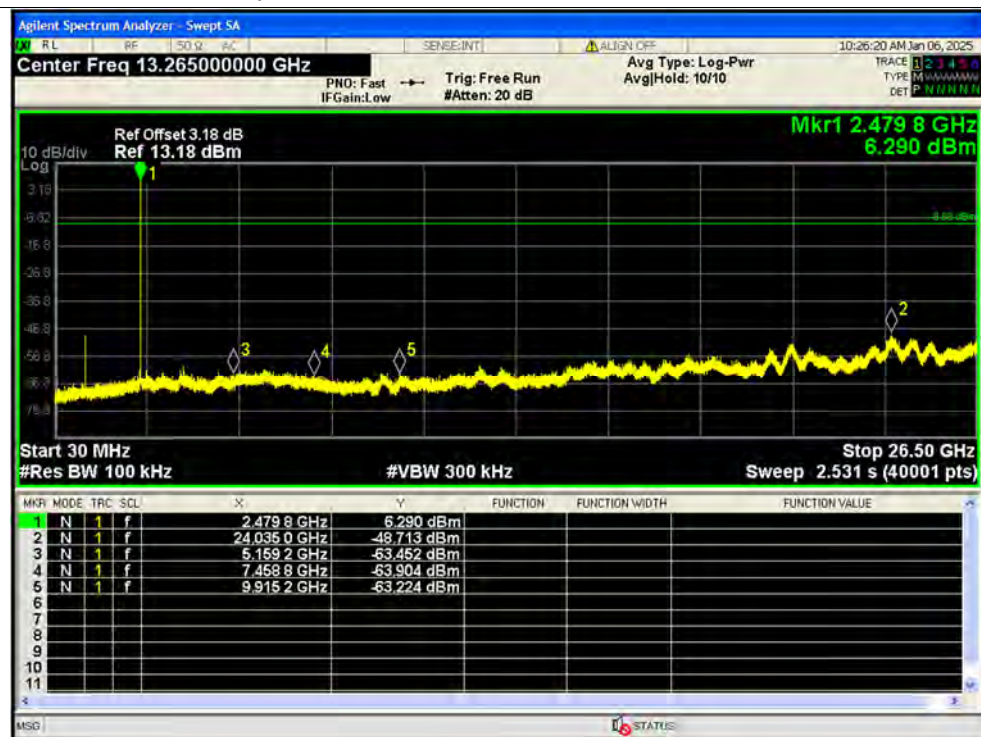
Tx. Spurious NVNT 2-DH5 2441MHz Ant1 Emission



Tx. Spurious NVNT 2-DH5 2480MHz Ant1 Ref



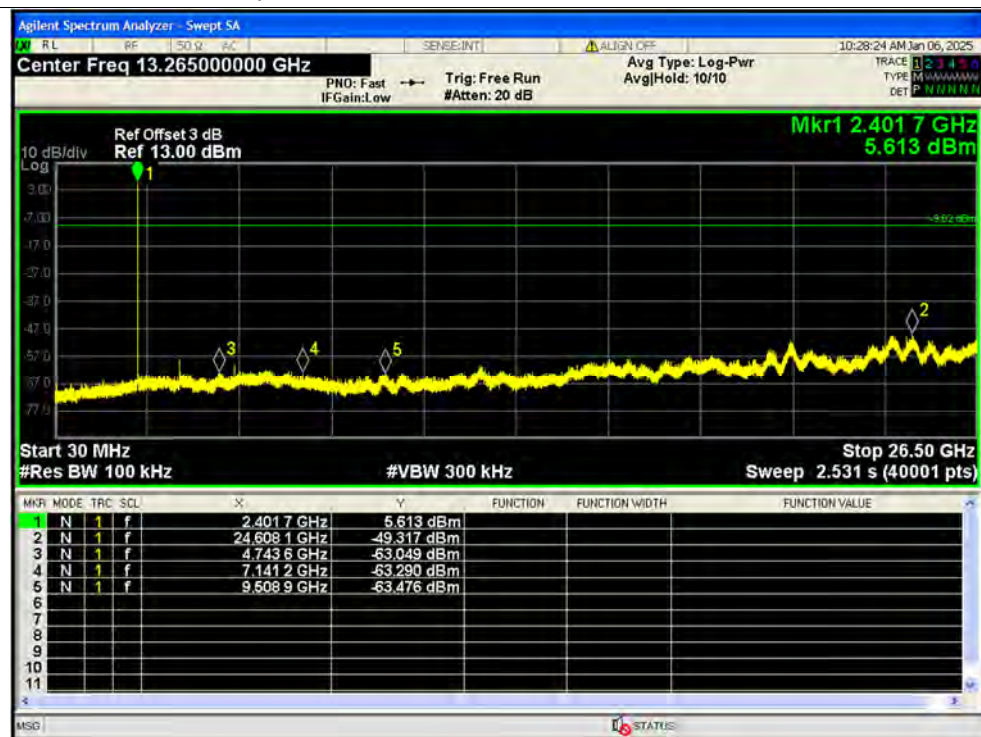
Tx. Spurious NVNT 2-DH5 2480MHz Ant1 Emission



Tx. Spurious NVNT 3-DH5 2402MHz Ant1 Ref



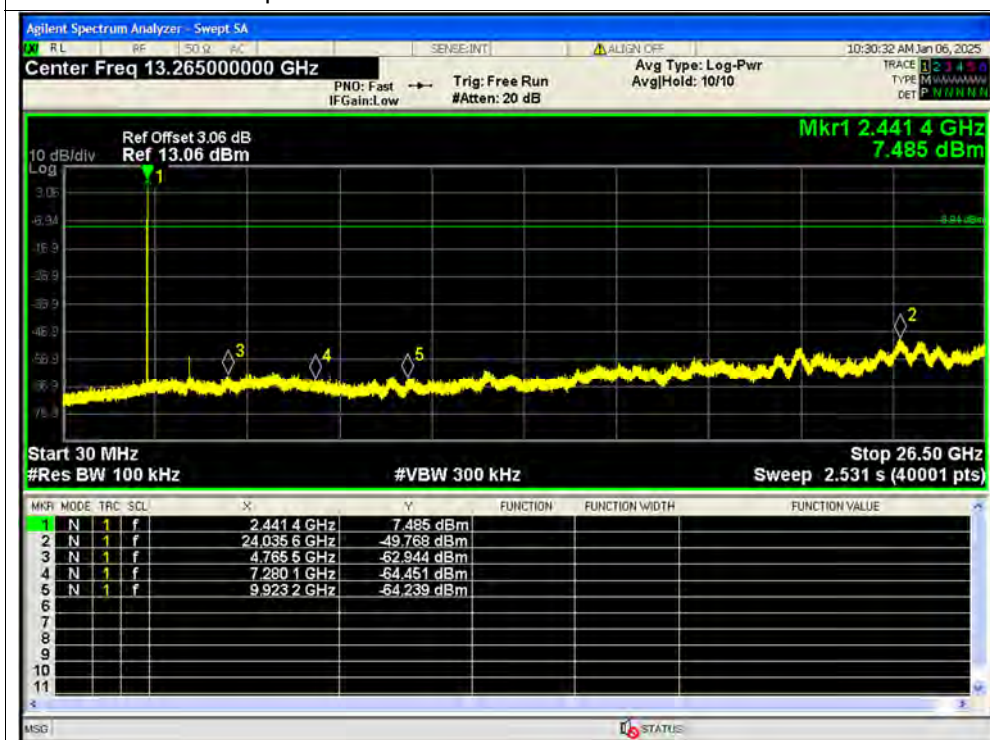
Tx. Spurious NVNT 3-DH5 2402MHz Ant1 Emission



Tx. Spurious NVNT 3-DH5 2441MHz Ant1 Ref



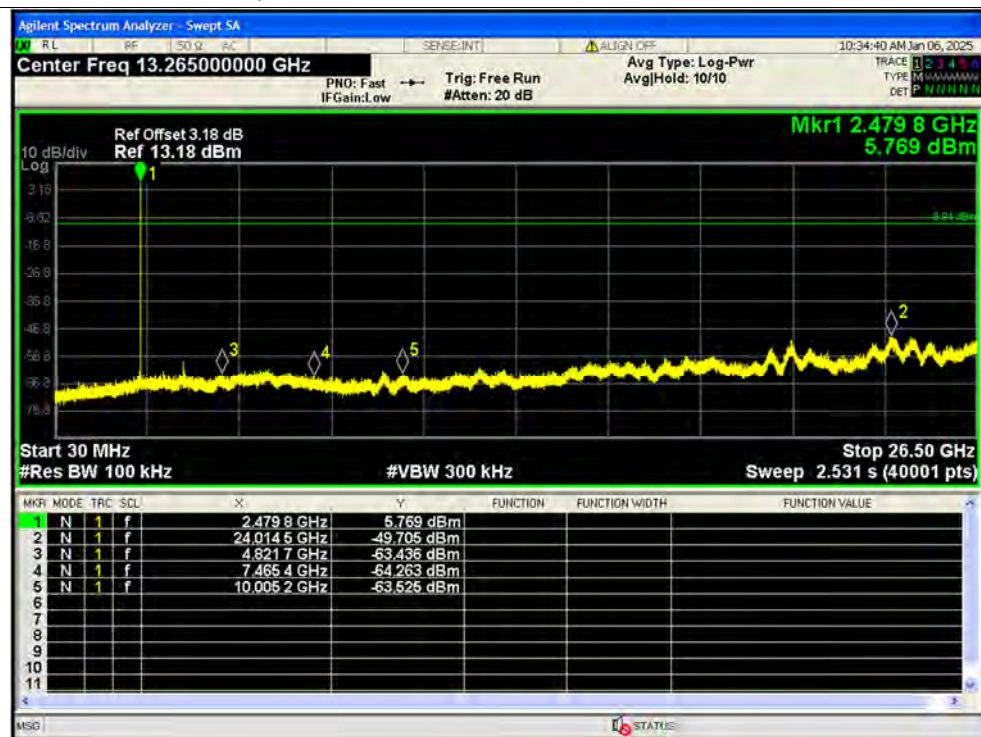
Tx. Spurious NVNT 3-DH5 2441MHz Ant1 Emission



Tx. Spurious NVNT 3-DH5 2480MHz Ant1 Ref



Tx. Spurious NVNT 3-DH5 2480MHz Ant1 Emission

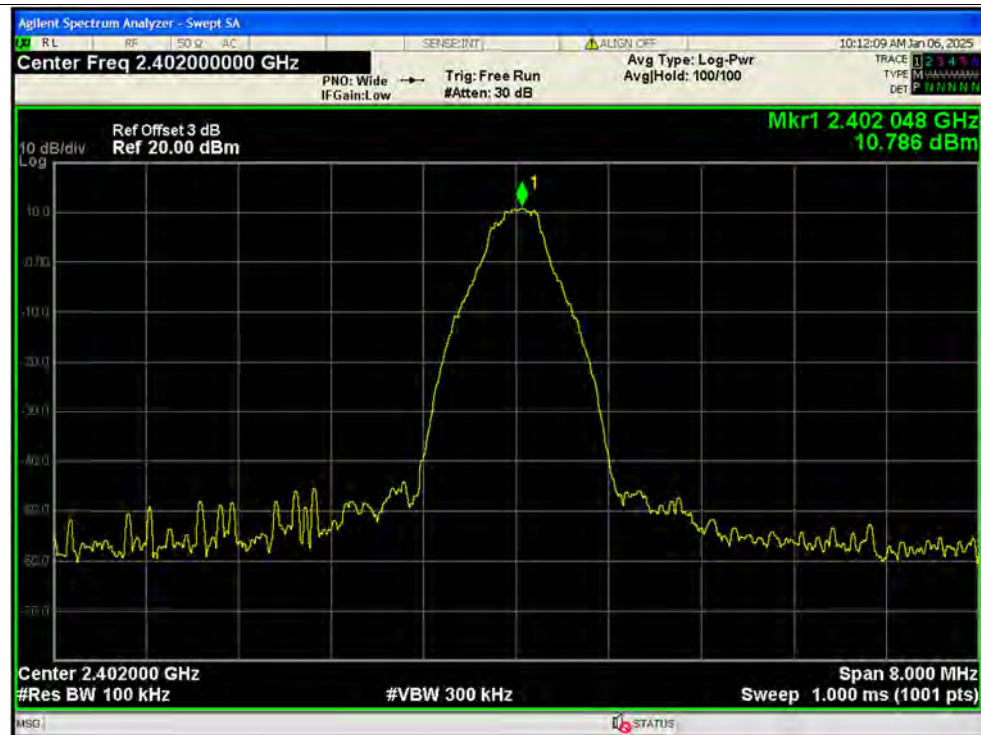


**A.9. Band Edge**

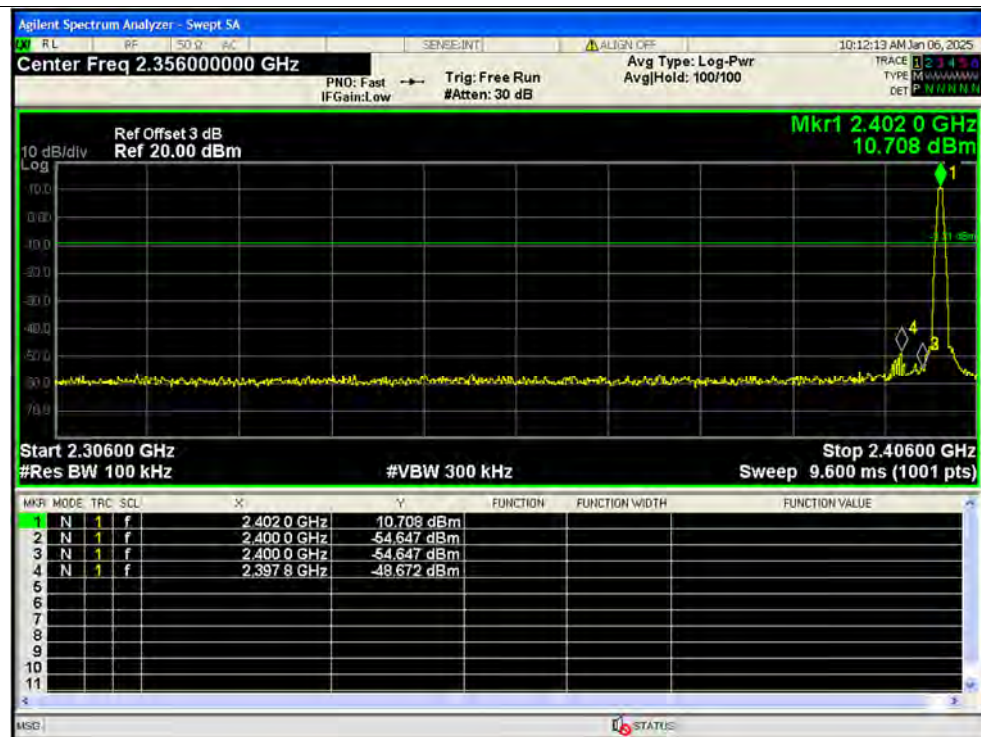
Condition	Mode	Frequency (MHz)	Antenna	Hopping Mode	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	1-DH5	2402	Ant1	No-Hopping	-59.46	-20	Pass
NVNT	1-DH5	2480	Ant1	No-Hopping	-64.9	-20	Pass
NVNT	2-DH5	2402	Ant1	No-Hopping	-54.25	-20	Pass
NVNT	2-DH5	2480	Ant1	No-Hopping	-62.39	-20	Pass
NVNT	3-DH5	2402	Ant1	No-Hopping	-59.88	-20	Pass
NVNT	3-DH5	2480	Ant1	No-Hopping	-64.87	-20	Pass
NVNT	1-DH5	2402	Ant1	Hopping	-65.24	-20	Pass
NVNT	1-DH5	2480	Ant1	Hopping	-64.99	-20	Pass
NVNT	2-DH5	2402	Ant1	Hopping	-64.25	-20	Pass
NVNT	2-DH5	2480	Ant1	Hopping	-62.3	-20	Pass
NVNT	3-DH5	2402	Ant1	Hopping	-64.55	-20	Pass
NVNT	3-DH5	2480	Ant1	Hopping	-62.73	-20	Pass

Test Graphs

Band Edge NVNT 1-DH5 2402MHz Ant1 No-Hopping Ref



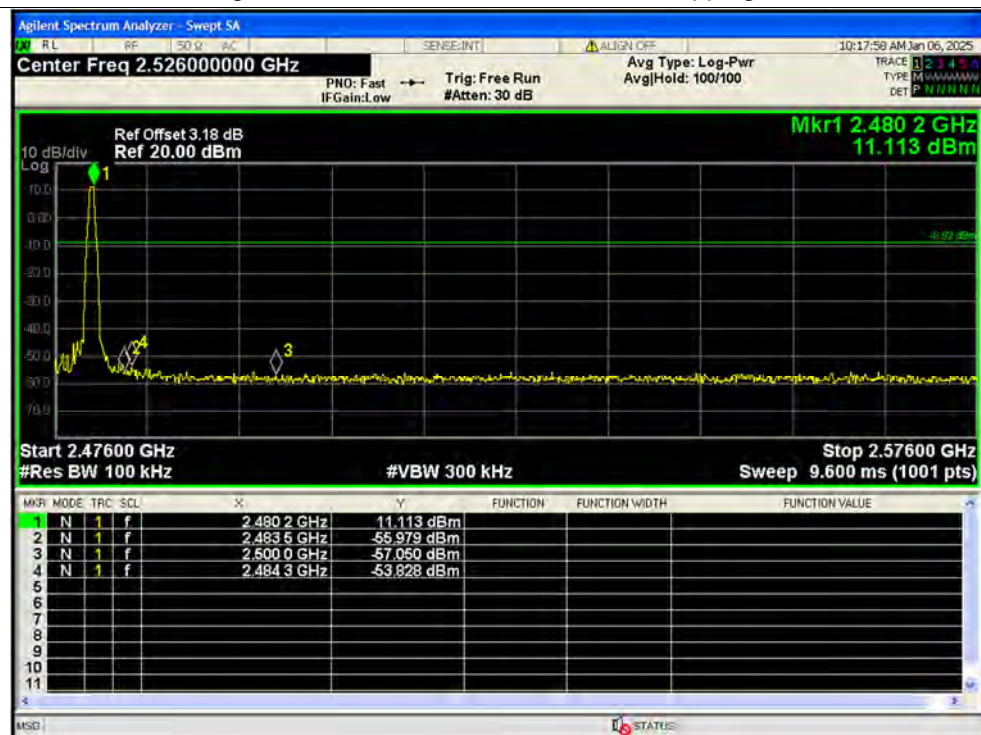
Band Edge NVNT 1-DH5 2402MHz Ant1 No-Hopping Emission



Band Edge NVNT 1-DH5 2480MHz Ant1 No-Hopping Ref



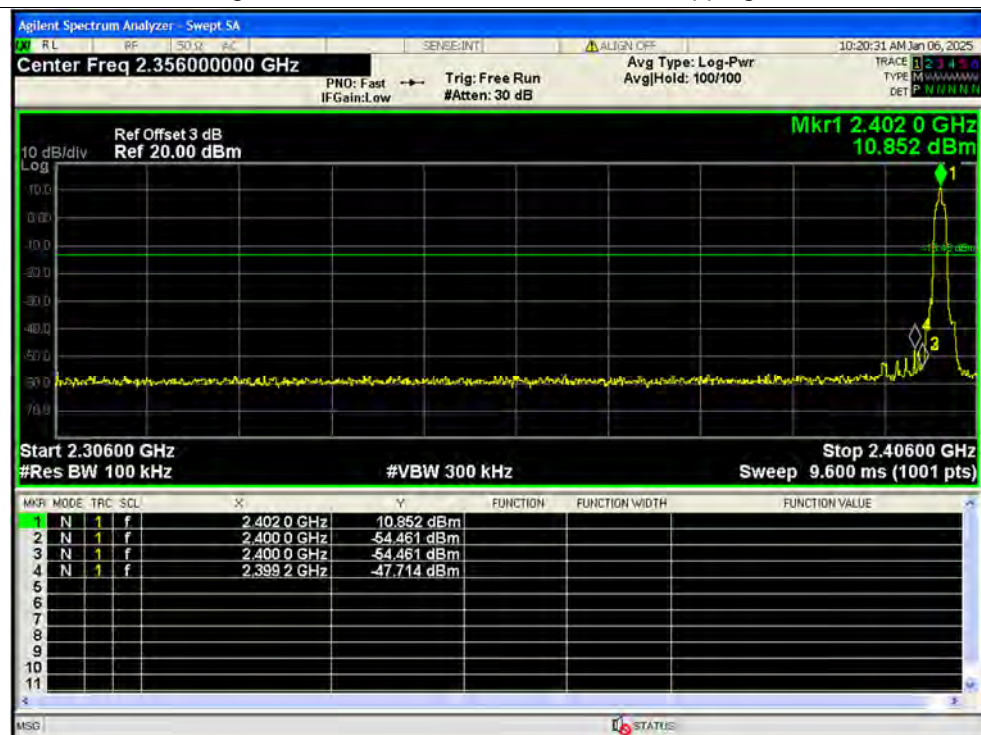
Band Edge NVNT 1-DH5 2480MHz Ant1 No-Hopping Emission



Band Edge NVNT 2-DH5 2402MHz Ant1 No-Hopping Ref



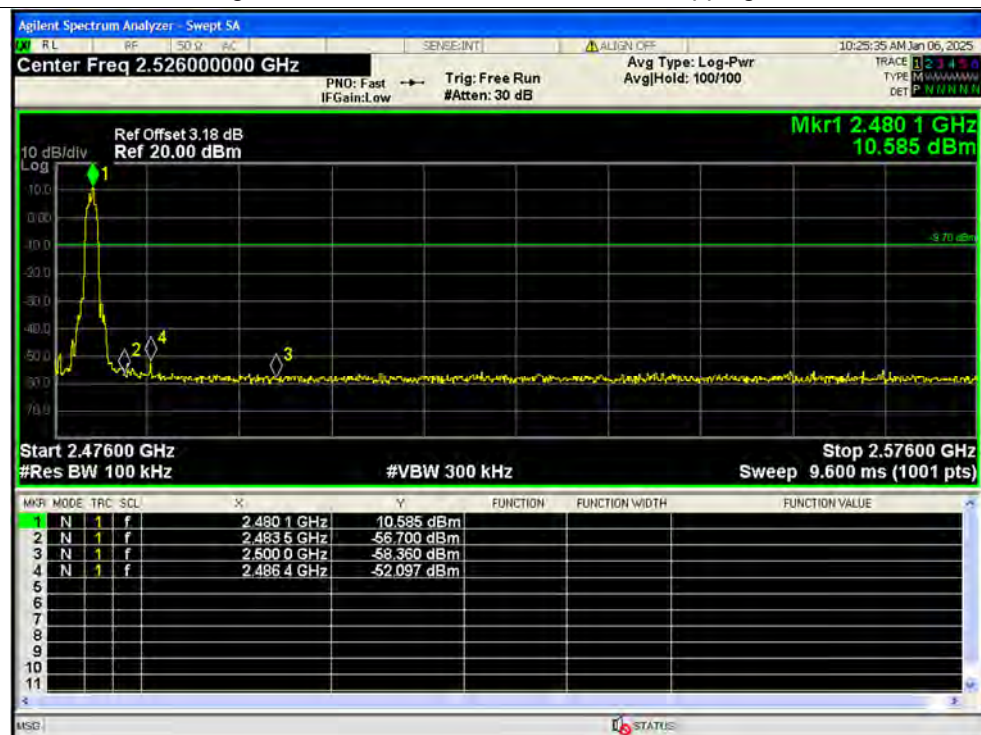
Band Edge NVNT 2-DH5 2402MHz Ant1 No-Hopping Emission



Band Edge NVNT 2-DH5 2480MHz Ant1 No-Hopping Ref



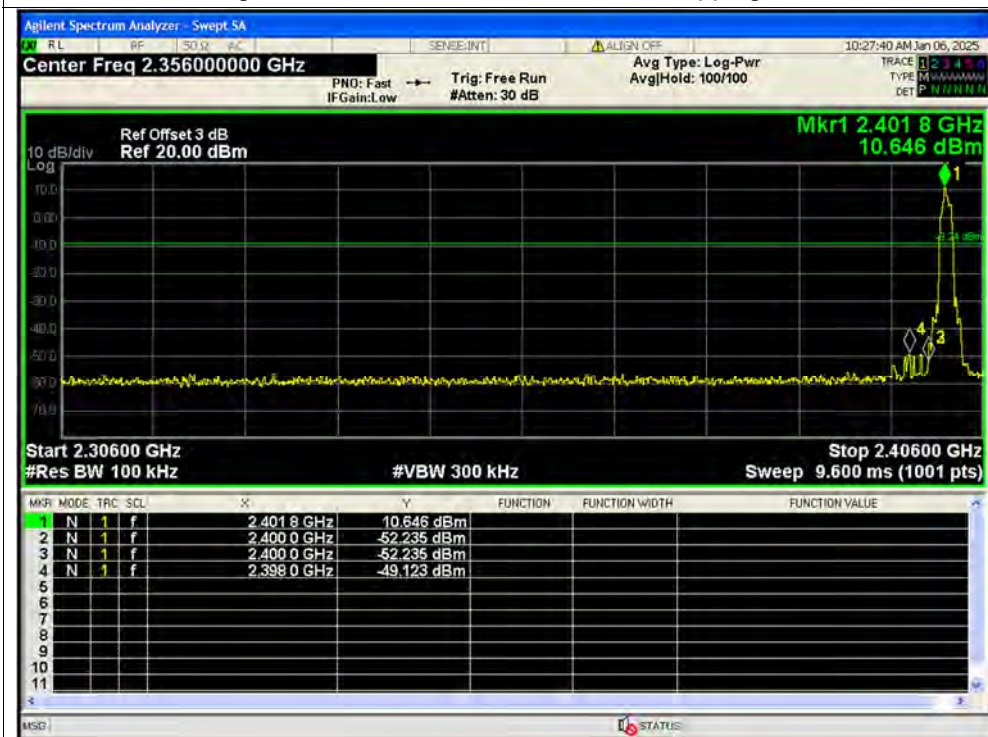
Band Edge NVNT 2-DH5 2480MHz Ant1 No-Hopping Emission



Band Edge NVNT 3-DH5 2402MHz Ant1 No-Hopping Ref



Band Edge NVNT 3-DH5 2402MHz Ant1 No-Hopping Emission

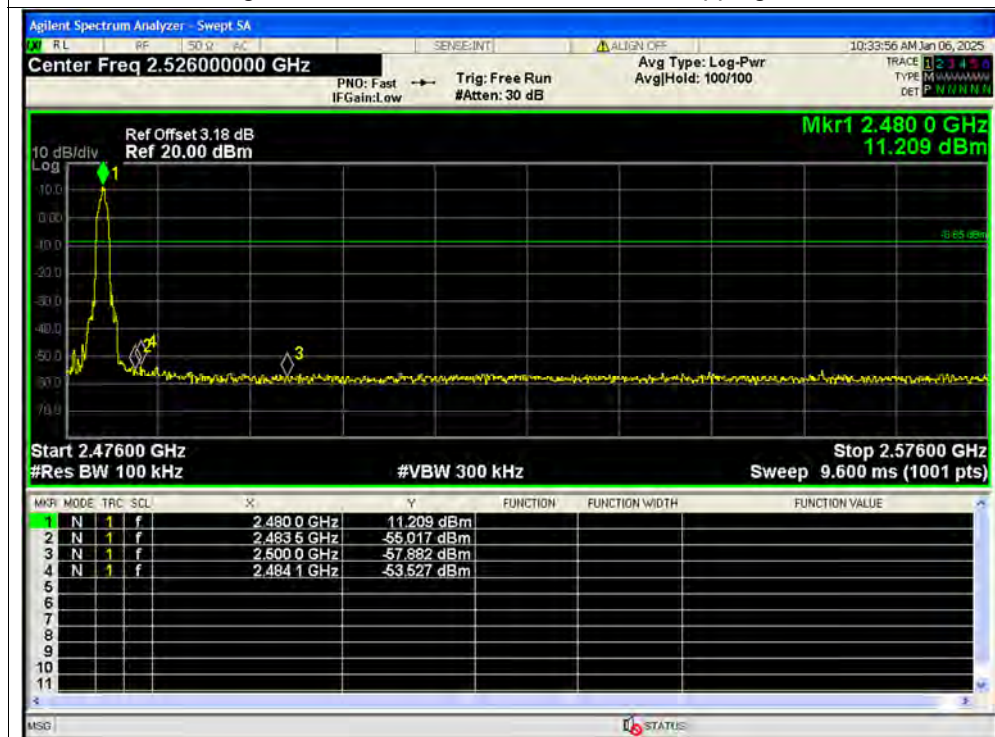




Band Edge NVNT 3-DH5 2480MHz Ant1 No-Hopping Ref

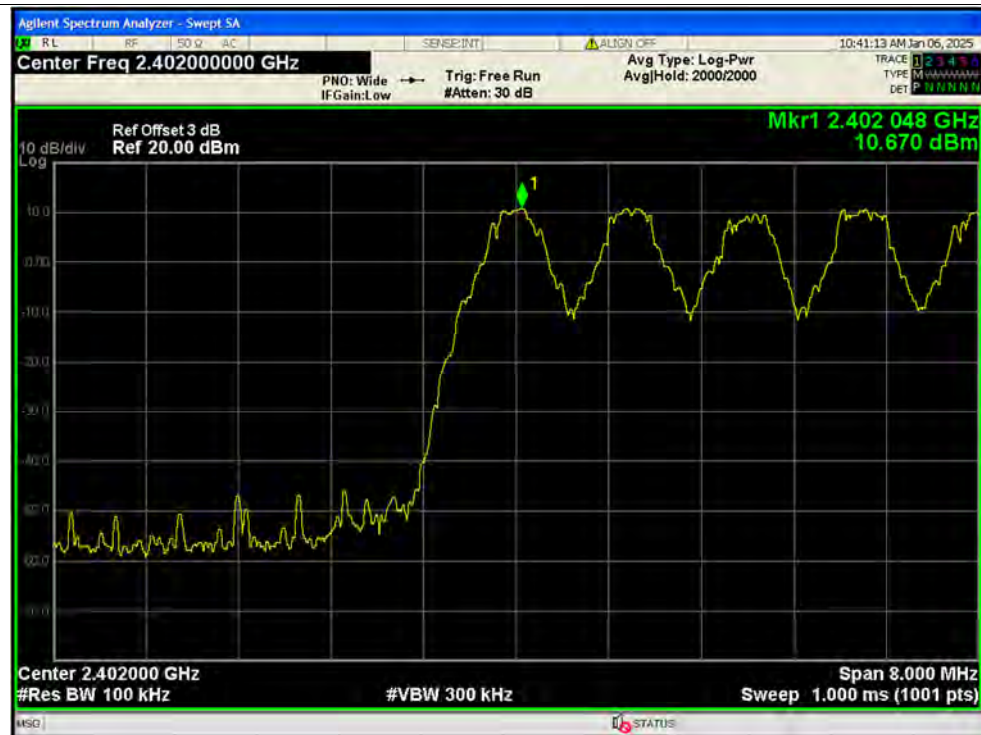


Band Edge NVNT 3-DH5 2480MHz Ant1 No-Hopping Emission

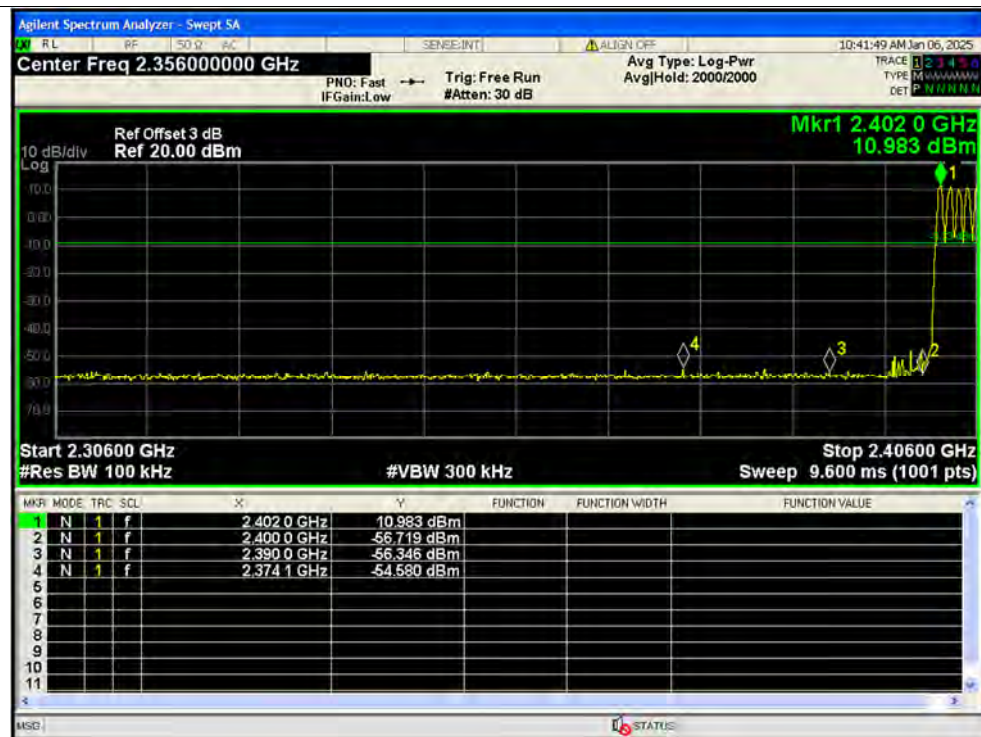


Test Graphs

Band Edge(Hopping) NVNT 1-DH5 2402MHz Ant1 Hopping Ref



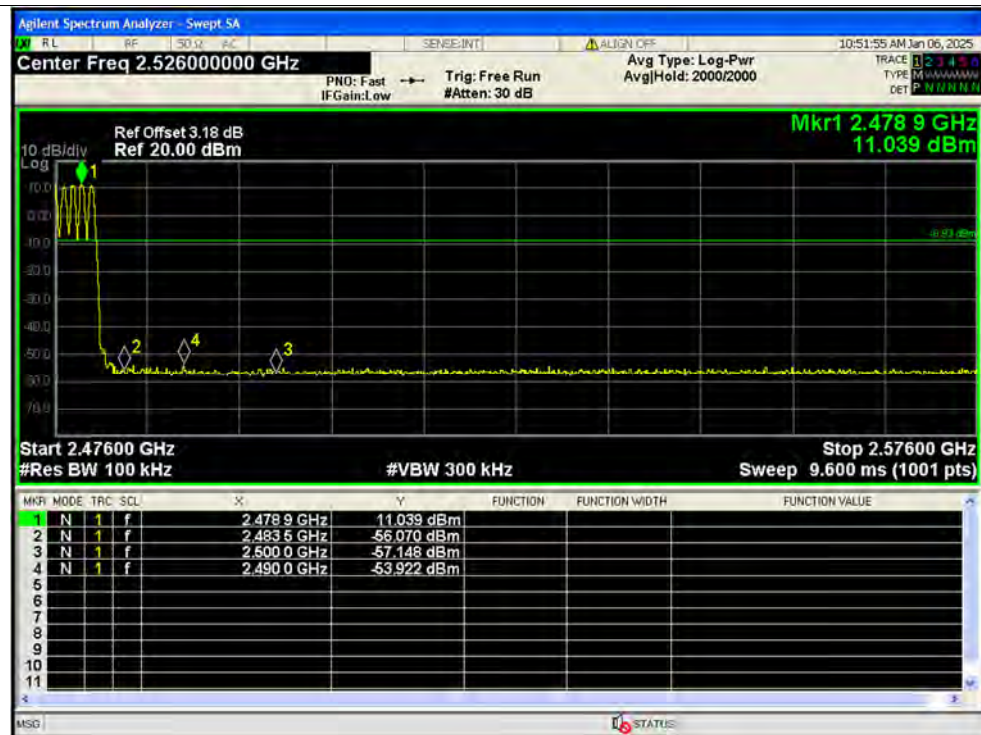
Band Edge(Hopping) NVNT 1-DH5 2402MHz Ant1 Hopping Emission



Band Edge(Hopping) NVNT 1-DH5 2480MHz Ant1 Hopping Ref



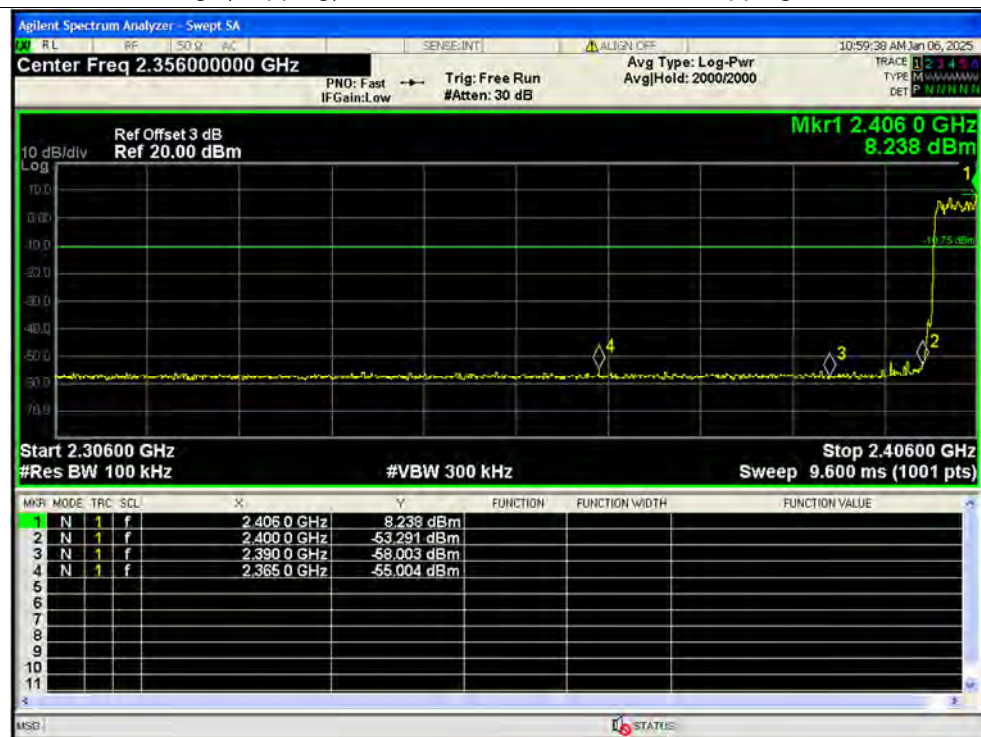
Band Edge(Hopping) NVNT 1-DH5 2480MHz Ant1 Hopping Emission



Band Edge(Hopping) NVNT 2-DH5 2402MHz Ant1 Hopping Ref



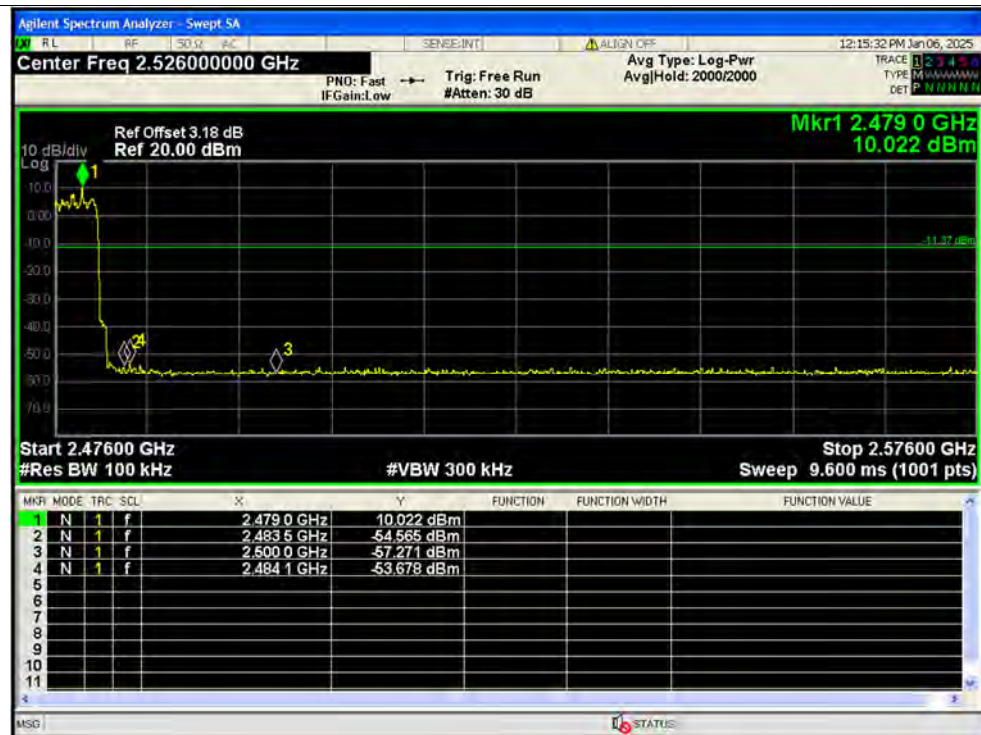
Band Edge(Hopping) NVNT 2-DH5 2402MHz Ant1 Hopping Emission



Band Edge(Hopping) NVNT 2-DH5 2480MHz Ant1 Hopping Ref



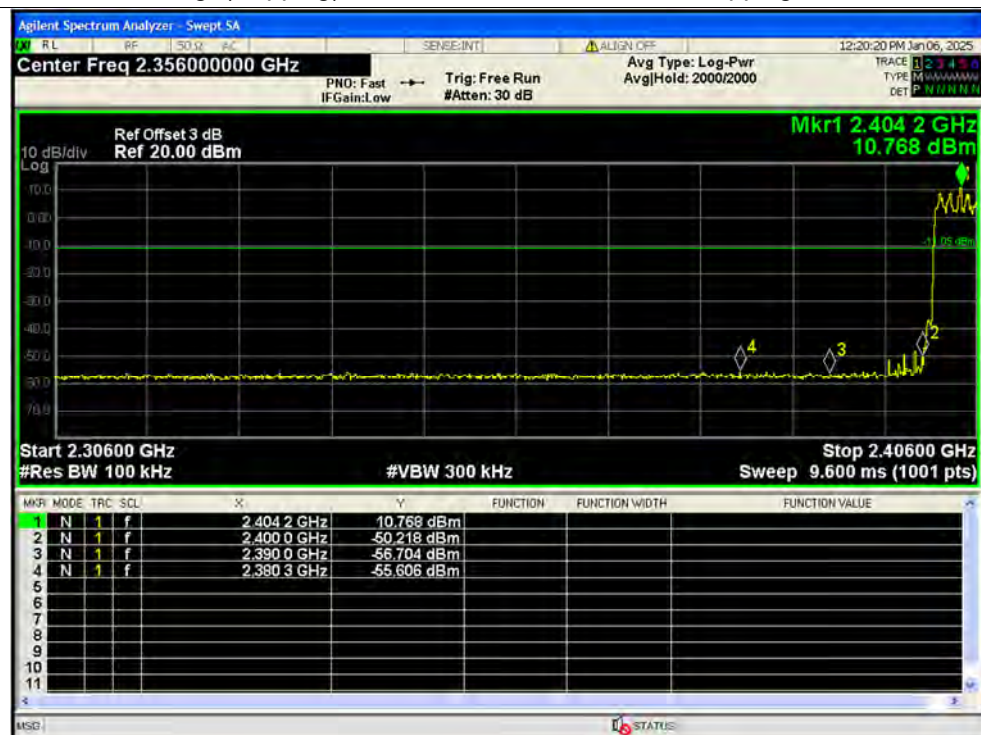
Band Edge(Hopping) NVNT 2-DH5 2480MHz Ant1 Hopping Emission



Band Edge(Hopping) NVNT 3-DH5 2402MHz Ant1 Hopping Ref



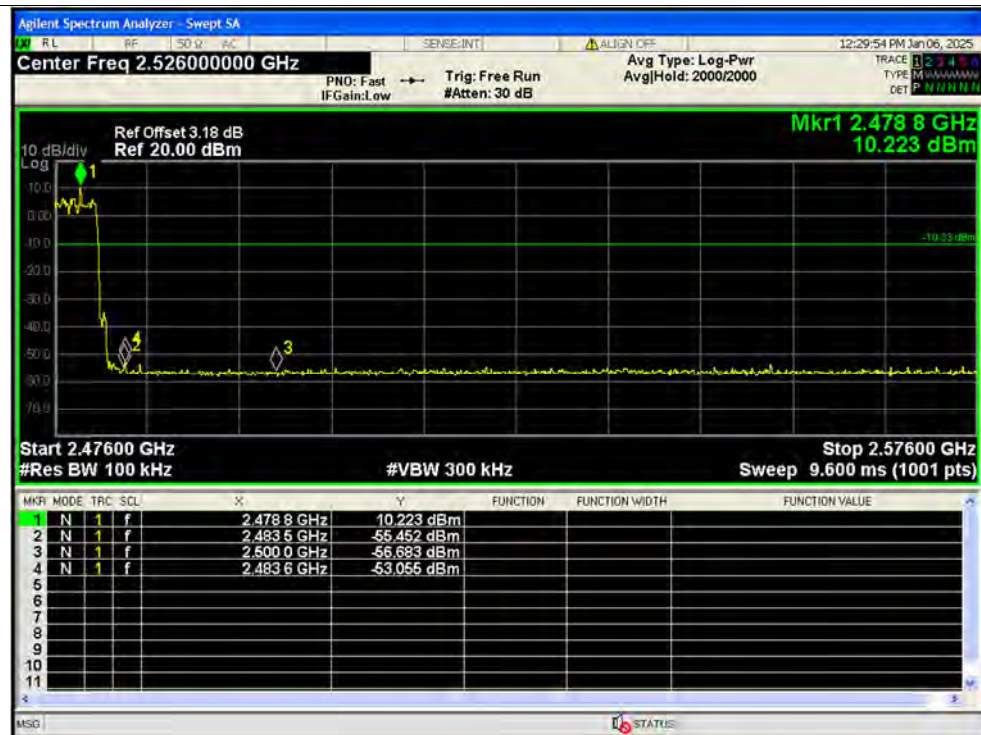
Band Edge(Hopping) NVNT 3-DH5 2402MHz Ant1 Hopping Emission



Band Edge(Hopping) NVNT 3-DH5 2480MHz Ant1 Hopping Ref



Band Edge(Hopping) NVNT 3-DH5 2480MHz Ant1 Hopping Emission





A.10. Conducted Emission

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Set RBW=9kHz, VBW=30kHz. Refer to recorded points and plots below.

Note: Both of the test voltage AC 120V/60Hz and AC 230V/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A. Test Setup:

Test Mode: EUT+Adapter+U disk+loud speaker+PC1++PC adapter1+PC2+PC adapter2+HDMI cable1+HDMI cable2+BT TX

Test voltage: AC 120V/60Hz

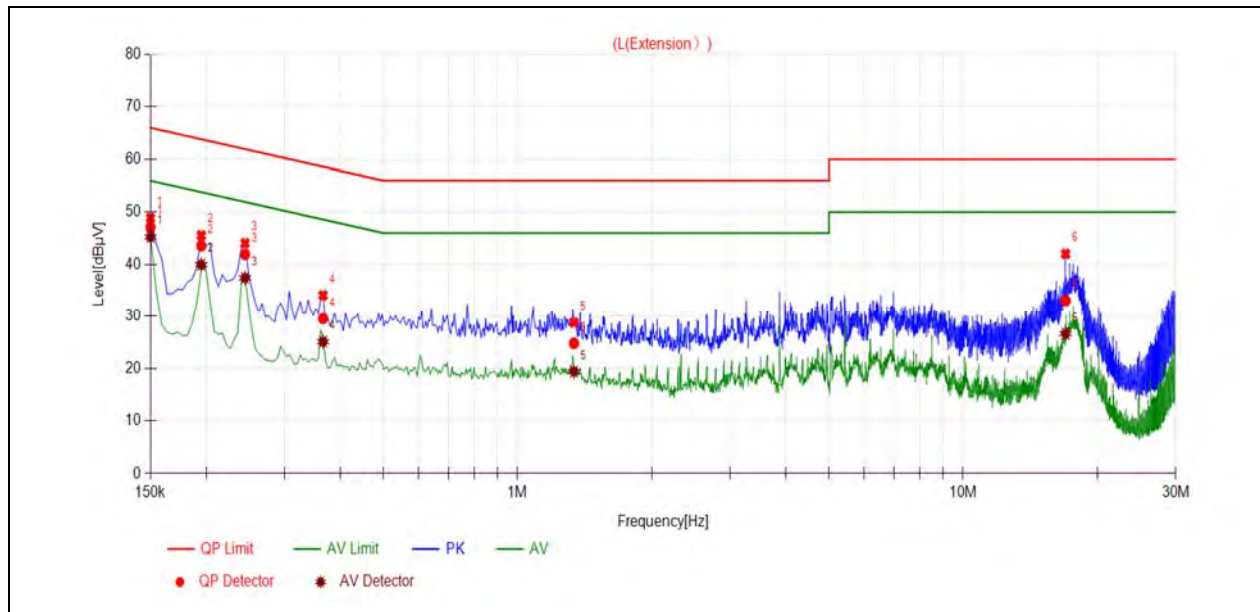
The measurement results are obtained as below:

$$E [\text{dB}\mu\text{V}] = U_R + L_{\text{Cable loss}} [\text{dB}] + A_{\text{Factor}}$$

U_R : Receiver Reading

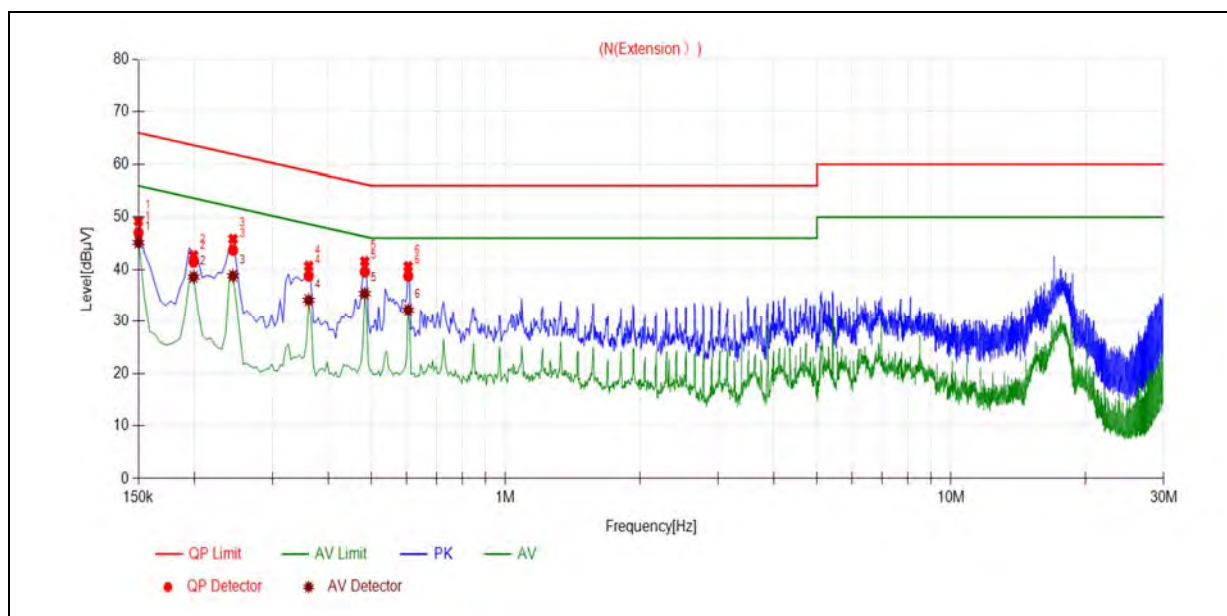
A_{Factor} : Voltage division factor of LISN

B. Test Plot:



(L Phase)

No.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1500	47.22	45.26	66.00	56.00	Line	PASS
2	0.1950	43.60	39.97	63.82	53.82		PASS
3	0.2445	41.94	37.45	61.94	51.94		PASS
4	0.3660	29.54	25.08	58.59	48.59		PASS
5	1.3380	24.78	19.36	56.00	46.00		PASS
6	16.9785	33.07	26.62	60.00	50.00		PASS



(N Phase)

No.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1500	47.05	45.15	66.00	56.00	Neutral	PASS
2	0.1995	41.46	38.60	63.63	53.63		PASS
3	0.2445	43.72	38.80	61.94	51.94		PASS
4	0.3615	38.80	34.13	58.69	48.69		PASS
5	0.4830	39.58	35.40	56.29	46.29		PASS
6	0.6045	38.78	32.24	56.00	46.00		PASS

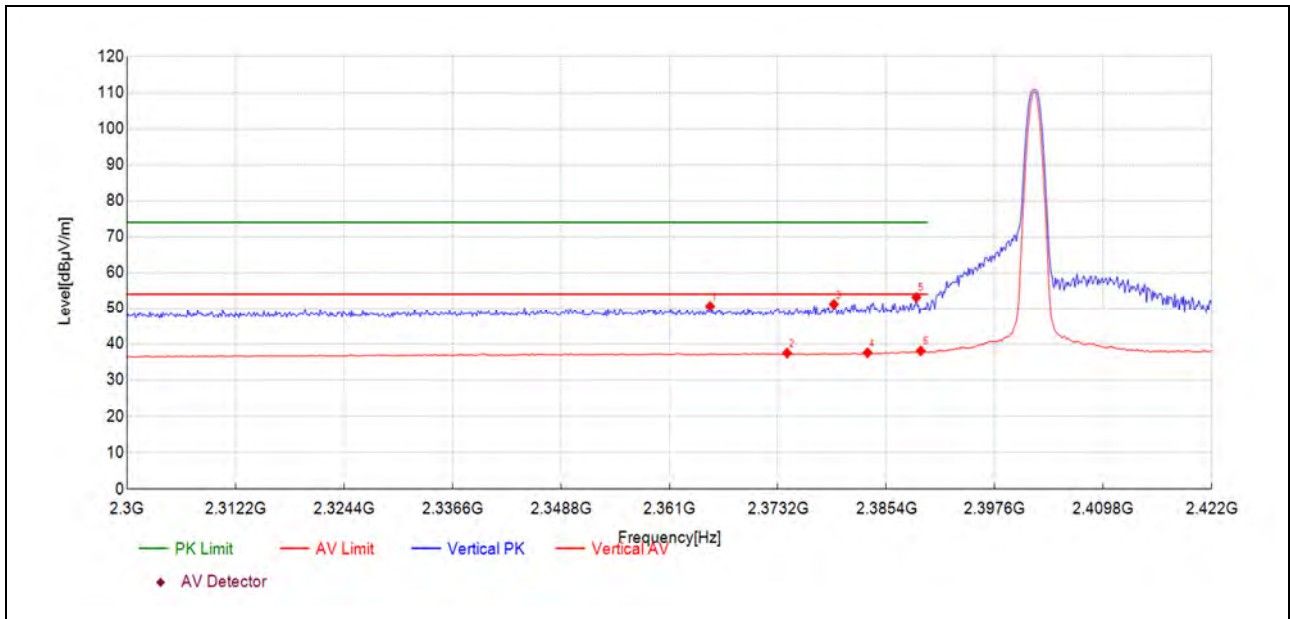
A.11. Restricted Frequency Bands

Note 1: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (Horizontal) was recorded in this test report.

Note 2: All test modes were considered and evaluated respectively by performing full test, only the worst data were recorded.

GFSK Mode

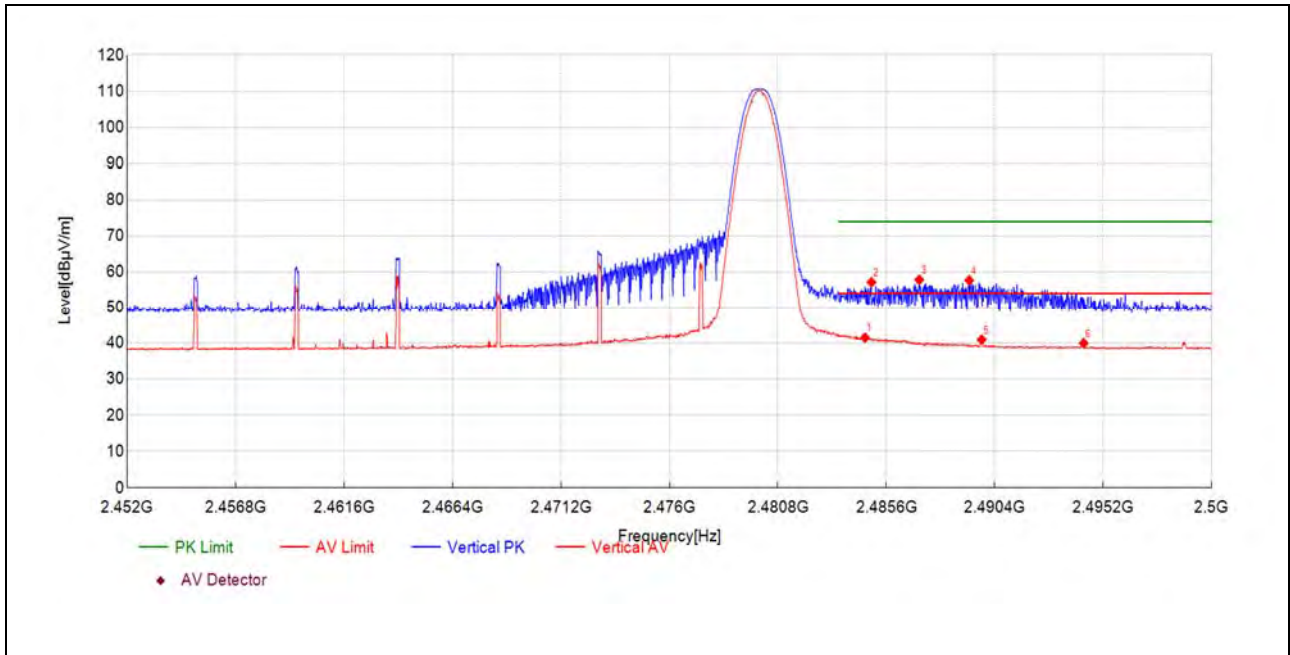
Plot for Channel 0



Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Verdict
2365.58	13.2	50.66	37.470	74.00	23.34	150	267	PK	PASS
2374.25	0.0	37.48	37.480	54.00	16.52	150	124	AV	PASS
2379.50	13.8	51.24	37.480	74.00	22.76	150	212	PK	PASS
2383.29	0.1	37.57	37.480	54.00	16.43	150	212	AV	PASS
2388.78	15.7	53.21	37.490	74.00	20.79	150	313	PK	PASS
2389.27	0.6	38.10	37.490	54.00	15.90	150	200	AV	PASS



Plot for Channel 78

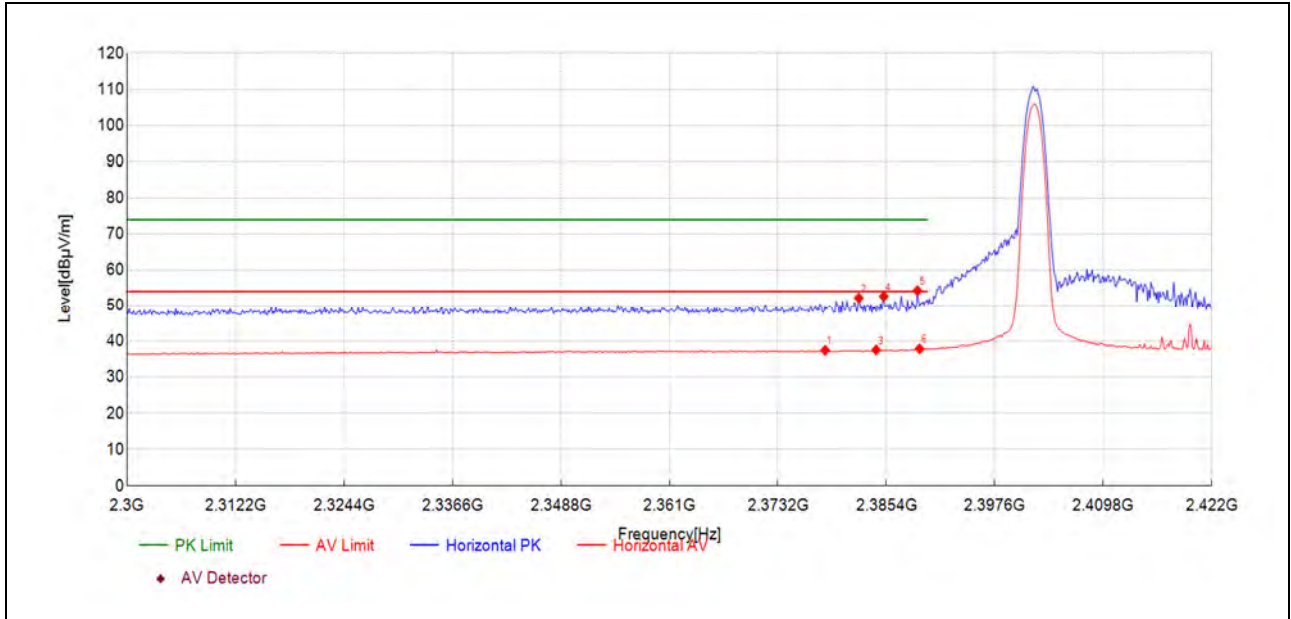


Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Verdict
2484.66	3.2	41.51	38.270	54.00	12.49	150	307	AV	PASS
2484.94	18.9	57.18	38.270	74.00	16.82	150	307	PK	PASS
2487.06	19.6	57.84	38.270	74.00	16.16	150	303	PK	PASS
2489.27	19.4	57.69	38.260	74.00	16.31	150	307	PK	PASS
2489.82	2.7	40.96	38.260	54.00	13.04	150	172	AV	PASS
2494.33	1.7	39.96	38.260	54.00	14.04	150	172	AV	PASS



8-DPSK Mode

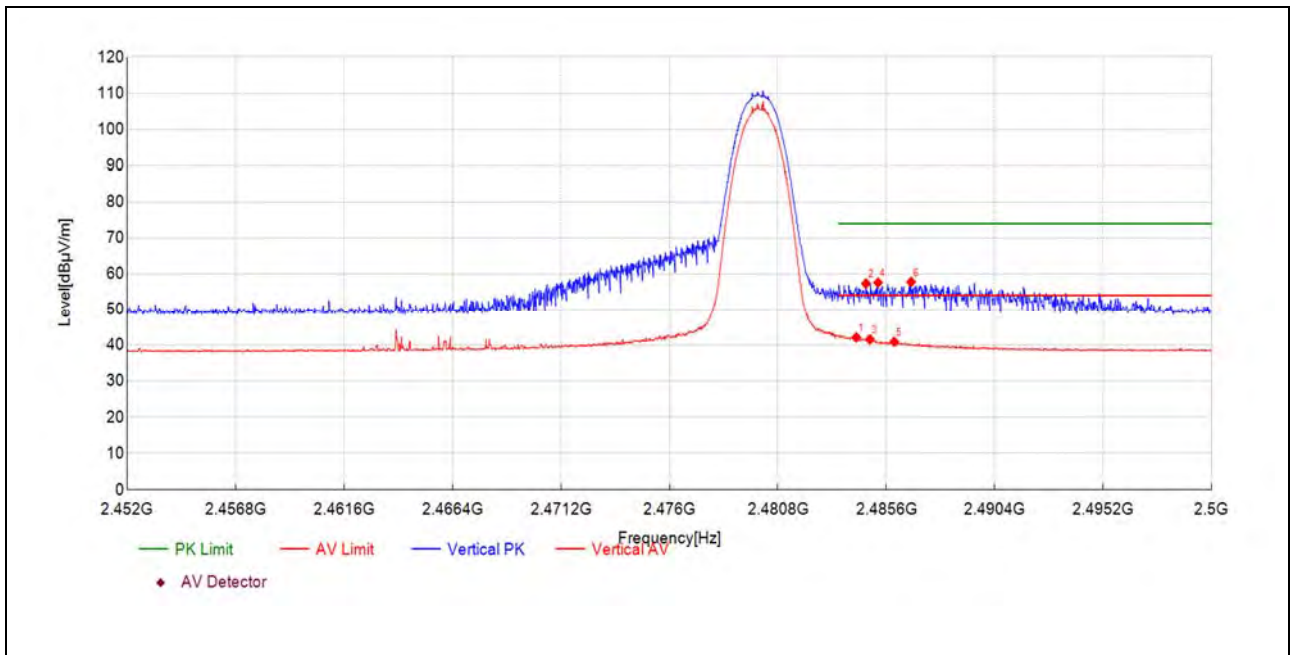
Plot for Channel 0



Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Verdict
2378.52	0.0	37.48	37.480	54.00	16.52	150	93	AV	PASS
2382.31	14.7	52.22	37.480	74.00	21.78	150	317	PK	PASS
2384.26	0.1	37.59	37.490	54.00	16.41	150	89	AV	PASS
2385.12	15.2	52.69	37.490	74.00	21.31	150	216	PK	PASS
2388.90	16.8	54.28	37.490	74.00	19.72	150	321	PK	PASS
2389.15	0.4	37.88	37.490	54.00	16.12	150	216	AV	PASS



Plot for Channel 78



Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Verdict
2484.27	3.9	42.15	38.270	54.00	11.85	150	310	AV	PASS
2484.70	19.1	57.37	38.270	74.00	16.63	150	310	PK	PASS
2484.87	3.4	41.64	38.270	54.00	12.36	150	310	AV	PASS
2485.23	19.4	57.62	38.270	74.00	16.38	150	318	PK	PASS
2485.95	2.7	40.95	38.270	54.00	13.05	150	314	AV	PASS
2486.70	19.5	57.80	38.270	74.00	16.20	150	288	PK	PASS



A.12. Radiated Emission

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak (or average) limit, it is unnecessary to perform an quasi-peak measurement (or average).

The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V/m]} = U_R + A_T + A_{\text{Factor}} \text{ [dB]}; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]}$$

A_T : Total correction Factor except Antenna

U_R : Receiver Reading

G_{preamp} : Preamplifier Gain

A_{Factor} : Antenna Factor at 3m

During the test, the total correction Factor A_T and A_{Factor} were built in test software.

Note1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Note2: For the frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

Note3: For the frequency, which started from 18GHz to 10th harmonic of the highest frequency, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

Note 4: All test modes were considered and evaluated respectively by performing full test, only the worst data were recorded.

Field strength of fundamental:

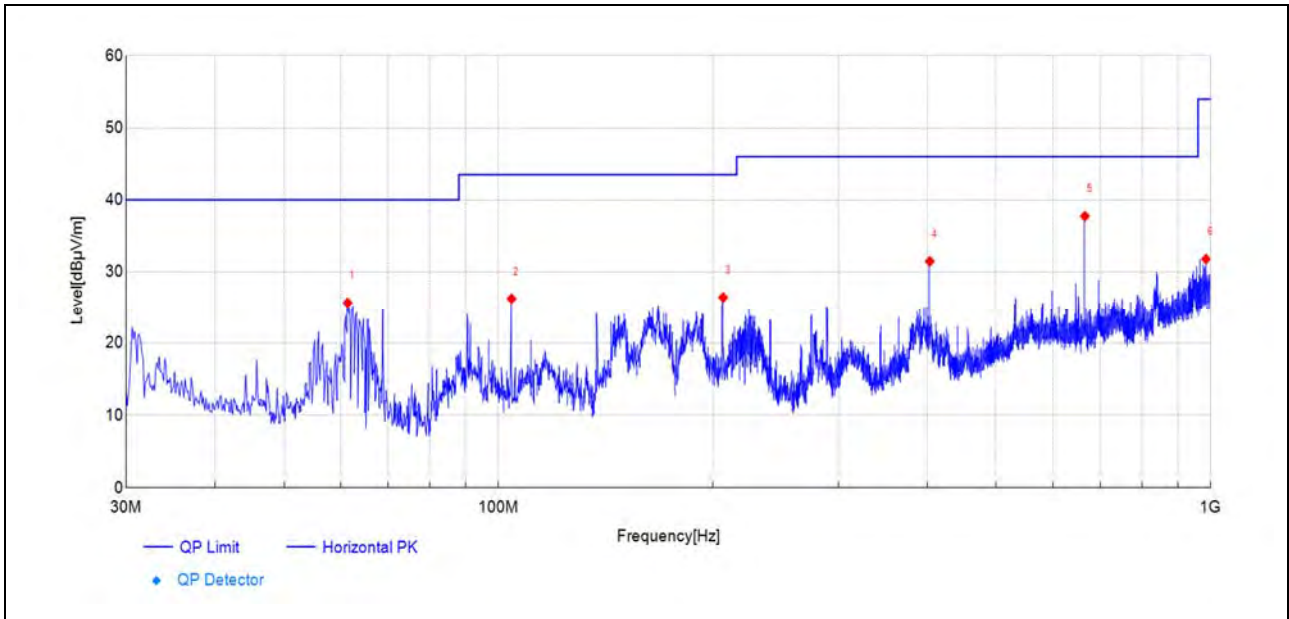
Frequency [MHz]	Reading [dB μ V]	Level [dB μ V/m]	Factor [dB/m]	Detector	Antenna Polarity
2401.97	73.4	110.89	37.530	PK	Vertical

The field strength (the lowest) of fundamenta is more than 20dB higher than the unwanted emissions, in accordance with FCC part 15.215(b).



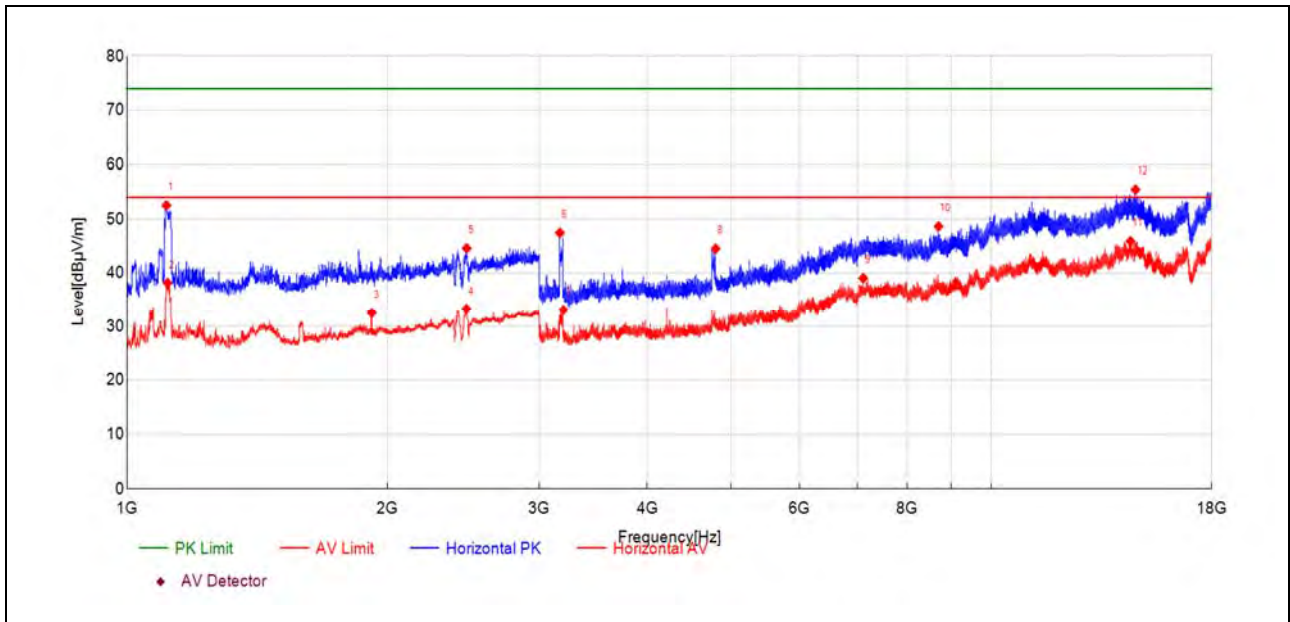
GFSK Mode

Plot for Channel 0



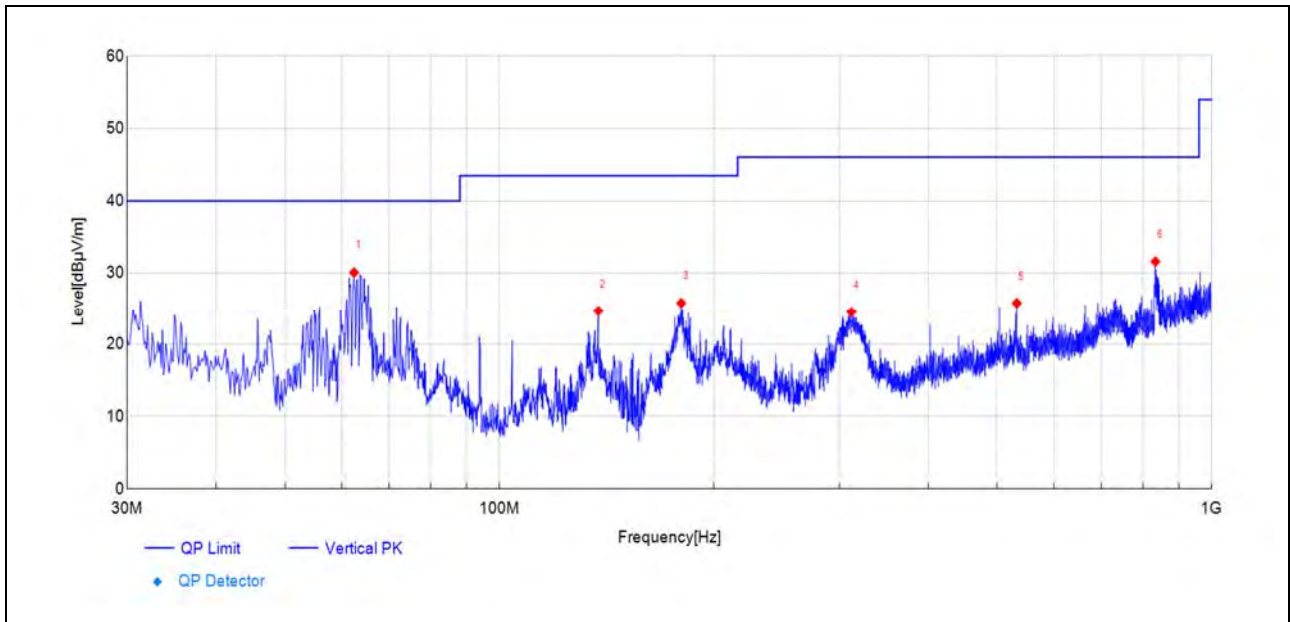
(Antenna Horizontal, 30MHz to 1GHz)

Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Verdict
61.40	54.4	25.69	-28.710	40.00	14.31	150	10	PK	PASS
104.33	55.8	26.27	-29.510	43.50	17.23	150	130	PK	PASS
206.78	55.9	26.45	-29.430	43.50	17.05	150	360	PK	PASS
403.21	54.4	31.49	-22.860	46.00	14.51	150	360	PK	PASS
665.71	53.9	37.75	-16.150	46.00	8.25	150	250	PK	PASS
984.84	42.9	31.80	-11.090	54.00	22.20	150	210	PK	PASS



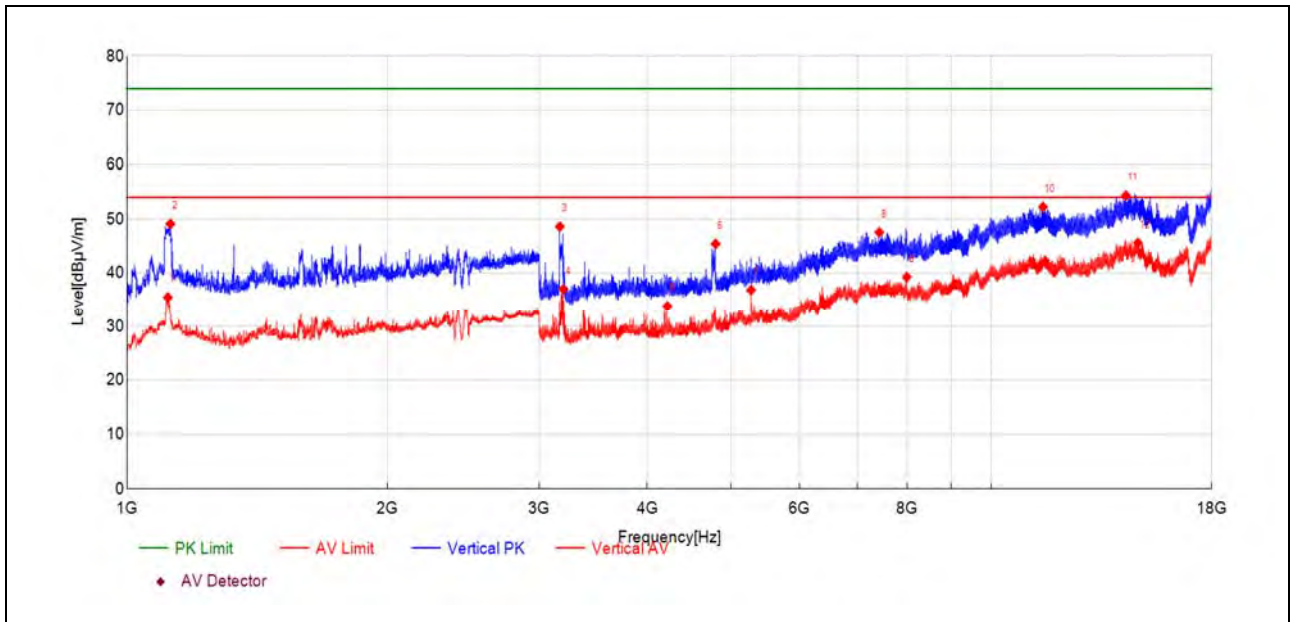
(Antenna Horizontal, 1GHz to 18GHz)

Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Verdict
1110.69	54.8	52.54	-2.260	74.00	21.46	150	163	PK	PASS
1113.80	40.4	38.18	-2.230	54.00	15.82	150	158	AV	PASS
1919.76	30.6	32.55	1.910	54.00	21.45	150	9	AV	PASS
2470.99	27.4	33.29	5.920	54.00	20.71	150	88	AV	PASS
2472.33	38.7	44.59	5.910	74.00	29.41	150	172	PK	PASS
3168.86	58.0	47.45	-10.570	74.00	26.55	150	334	PK	PASS
3199.29	44.0	33.11	-10.840	54.00	20.89	150	342	AV	PASS
4799.62	49.7	44.52	-5.180	74.00	29.48	150	296	PK	PASS
7111.40	34.9	39.06	4.200	54.00	14.94	150	179	AV	PASS
8692.45	42.0	48.65	6.620	74.00	25.35	150	8	PK	PASS
14493.76	26.2	45.91	19.740	54.00	8.09	150	117	AV	PASS
14691.33	34.9	55.46	20.580	74.00	18.54	150	279	PK	PASS



(Antenna Vertical, 30MHz to 1GHz)

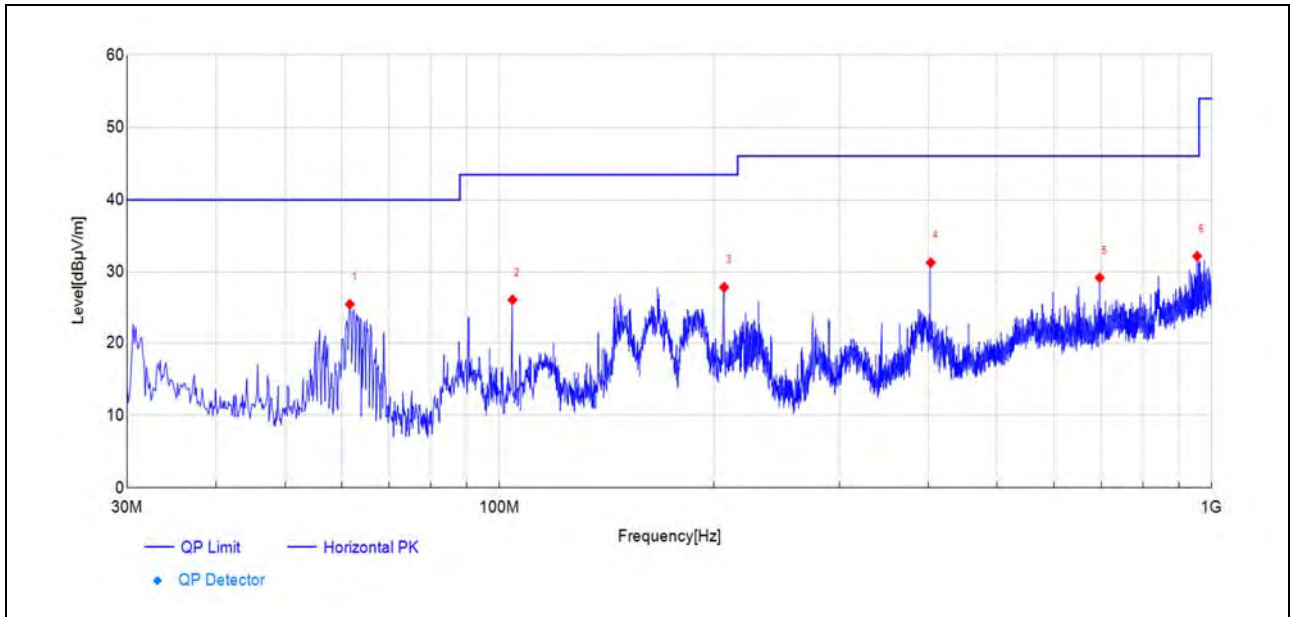
Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Verdict
62.50	58.9	30.07	-28.780	40.00	9.93	150	90	PK	PASS
137.67	56.8	24.70	-32.100	43.50	18.80	150	200	PK	PASS
179.99	56.2	25.81	-30.350	43.50	17.69	150	80	PK	PASS
312.03	50.1	24.52	-25.530	46.00	21.48	150	200	PK	PASS
532.58	44.8	25.80	-18.990	46.00	20.20	150	160	PK	PASS
833.77	45.5	31.60	-13.940	46.00	14.40	150	350	PK	PASS



(Antenna Vertical, 1GHz to 18GHz)

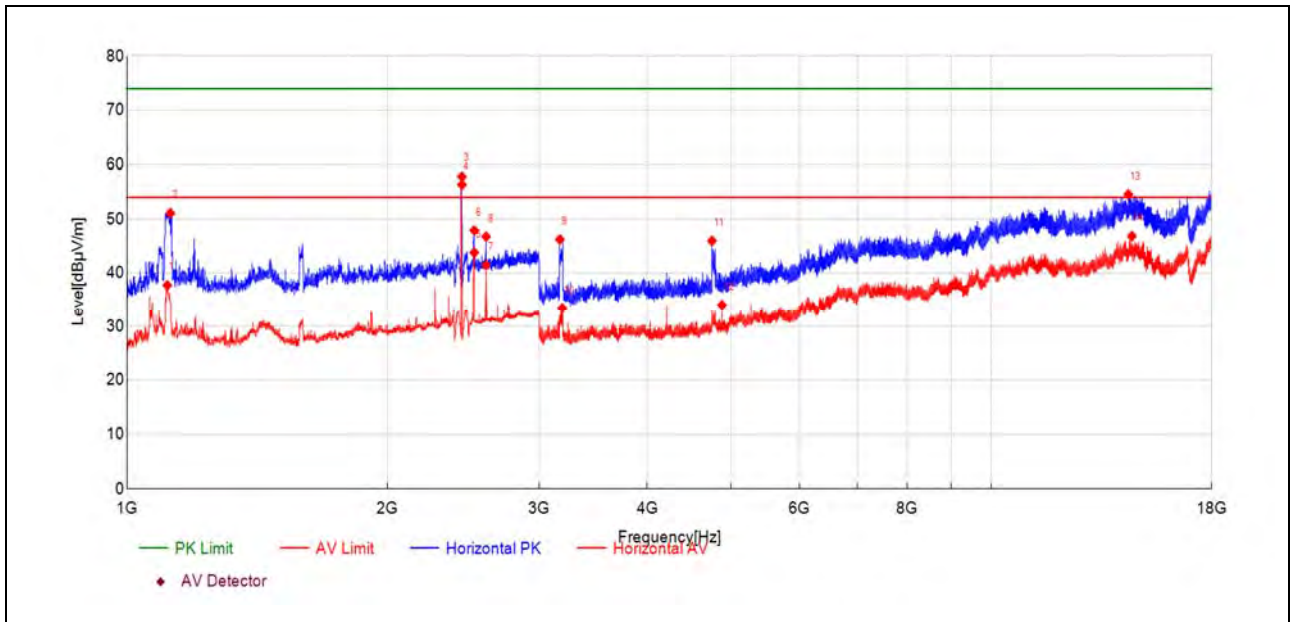
Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Verdict
1115.14	37.7	35.48	-2.230	54.00	18.52	150	166	AV	PASS
1122.69	51.3	49.11	-2.170	74.00	24.89	150	166	PK	PASS
3168.86	59.2	48.61	-10.570	74.00	25.39	150	217	PK	PASS
3198.01	47.9	37.03	-10.830	54.00	16.97	150	163	AV	PASS
4220.18	41.2	33.83	-7.400	54.00	20.17	150	171	AV	PASS
4799.19	50.6	45.40	-5.180	74.00	28.60	150	303	PK	PASS
5274.92	39.6	36.84	-2.790	54.00	17.16	150	296	AV	PASS
7423.41	42.9	47.55	4.670	74.00	26.45	150	351	PK	PASS
7987.43	34.3	39.29	4.960	54.00	14.71	150	101	AV	PASS
11482.96	38.0	52.23	14.230	74.00	21.77	150	0	PK	PASS
14323.18	35.0	54.36	19.410	74.00	19.64	150	289	PK	PASS
14784.34	25.8	45.61	19.860	54.00	8.39	150	101	AV	PASS

Plot for Channel 39



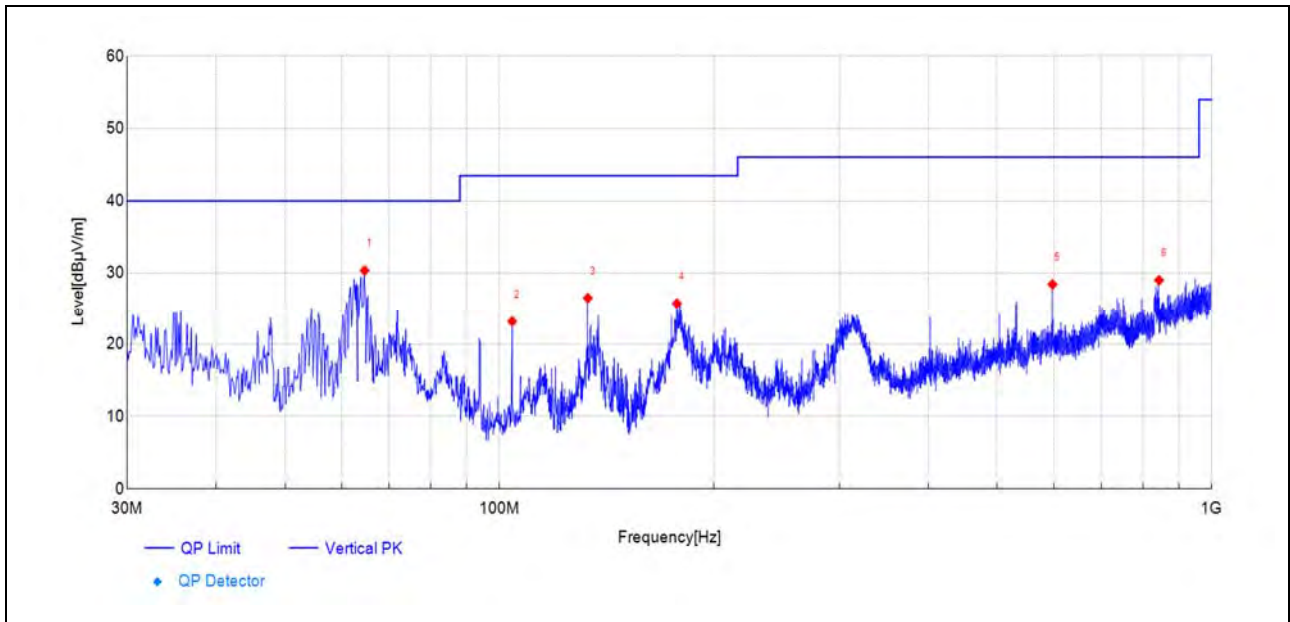
(Antenna Horizontal, 30MHz to 1GHz)

Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Verdict
61.65	54.2	25.54	-28.640	40.00	14.46	150	110	PK	PASS
104.33	55.7	26.15	-29.510	43.50	17.35	150	170	PK	PASS
206.78	57.3	27.89	-29.430	43.50	15.61	150	110	PK	PASS
403.21	54.2	31.31	-22.860	46.00	14.69	150	250	PK	PASS
696.03	44.8	29.21	-15.590	46.00	16.79	150	80	PK	PASS
953.93	43.7	32.21	-11.510	46.00	13.79	150	180	PK	PASS



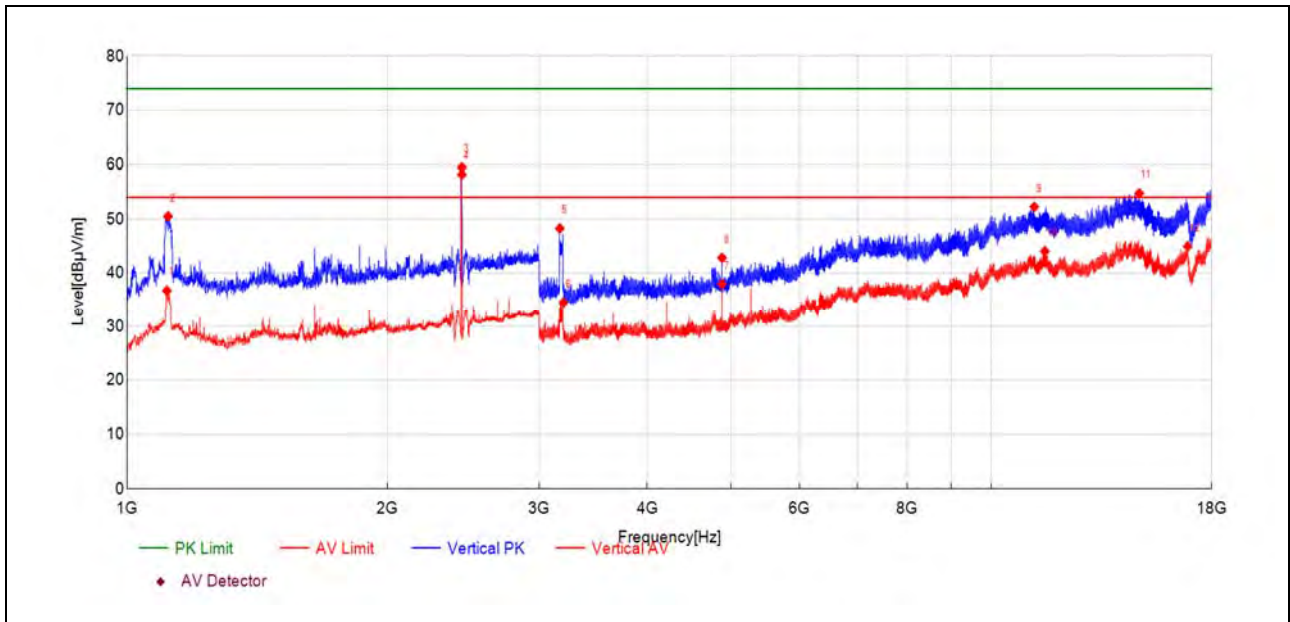
(Antenna Horizontal, 1GHz to 18GHz)

Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Verdict
1113.36	40.0	37.73	-2.240	54.00	16.27	150	161	AV	PASS
1122.25	53.3	51.09	-2.180	74.00	22.91	150	161	PK	PASS
2441.21	52.0	57.84	5.840	74.00	16.16	150	231	PK	N/A
2441.21	50.5	56.35	5.840	54.00	-2.35	150	231	AV	N/A
2522.12	38.1	43.80	5.680	54.00	10.20	150	198	AV	PASS
2522.56	42.2	47.90	5.680	74.00	26.10	150	198	PK	PASS
2603.47	35.4	41.48	6.040	54.00	12.52	150	198	AV	PASS
2603.47	40.7	46.76	6.040	74.00	27.24	150	198	PK	PASS
3168.86	56.8	46.24	-10.57	74.00	27.76	150	335	PK	PASS
3189.43	44.2	33.46	-10.75	54.00	20.54	150	203	AV	PASS
4753.34	51.5	45.96	-5.550	74.00	28.04	150	304	PK	PASS
4881.91	39.1	34.05	-5.020	54.00	19.95	150	203	AV	PASS



(Antenna Vertical, 30MHz to 1GHz)

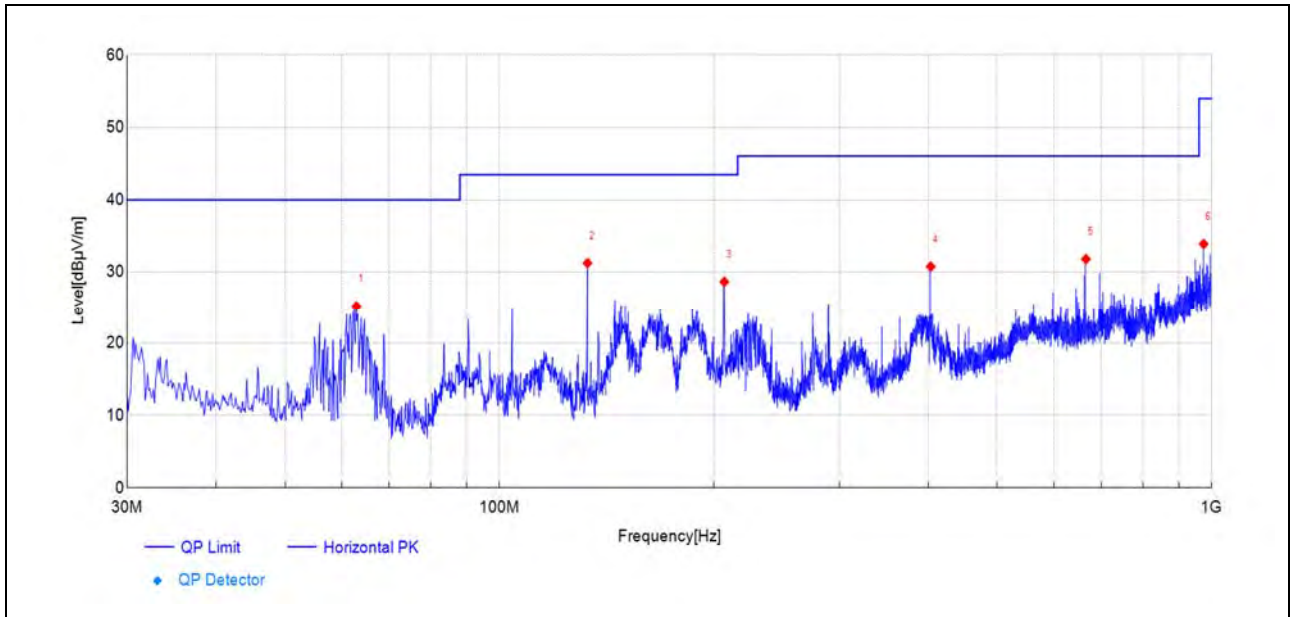
Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Verdict
64.68	59.6	30.36	-29.220	40.00	9.64	150	200	PK	PASS
104.21	52.7	23.17	-29.570	43.50	20.33	150	280	PK	PASS
133.06	58.4	26.51	-31.850	43.50	16.99	150	120	PK	PASS
177.44	56.4	25.76	-30.650	43.50	17.74	150	350	PK	PASS
597.69	45.7	28.43	-17.270	46.00	17.57	150	150	PK	PASS
843.35	42.6	29.01	-13.610	46.00	16.99	150	40	PK	PASS



(Antenna Vertical, 1GHz to 18GHz)

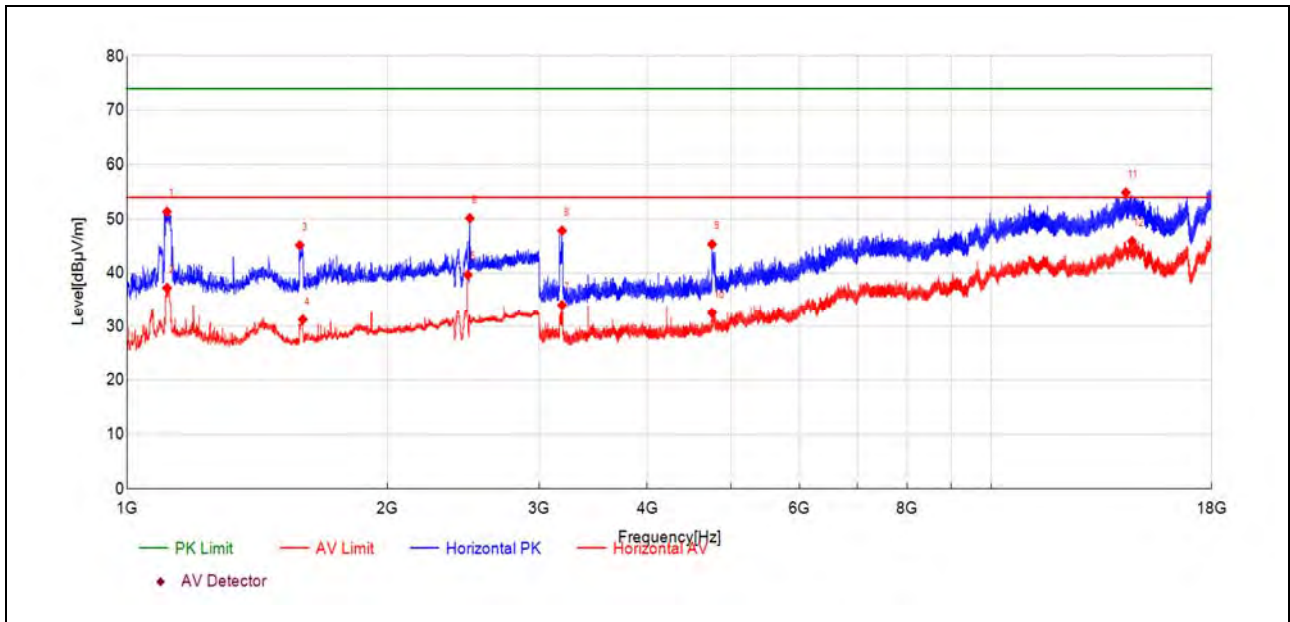
Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Verdict
1112.02	39.0	36.74	-2.250	54.00	17.26	150	153	AV	PASS
1115.58	52.7	50.51	-2.220	74.00	23.49	150	148	PK	PASS
2441.21	53.7	59.49	5.840	74.00	14.51	150	305	PK	N/A
2441.21	52.4	58.24	5.840	54.00	-4.24	150	305	AV	N/A
3168.86	58.8	48.27	-10.570	74.00	25.73	150	217	PK	PASS
3199.29	45.4	34.52	-10.840	54.00	19.48	150	217	AV	PASS
4881.91	43.0	37.98	-5.020	54.00	16.02	150	351	AV	PASS
4881.91	47.8	42.82	-5.020	74.00	31.18	150	334	PK	PASS
11220.23	38.9	52.25	13.380	74.00	21.75	150	116	PK	PASS
11536.96	29.7	44.05	14.350	54.00	9.95	150	172	AV	PASS
14840.0	35.5	54.78	19.330	74.00	19.22	150	116	PK	PASS
16883.11	24.6	44.96	20.350	54.00	9.04	150	134	AV	PASS

Plot for Channel 78



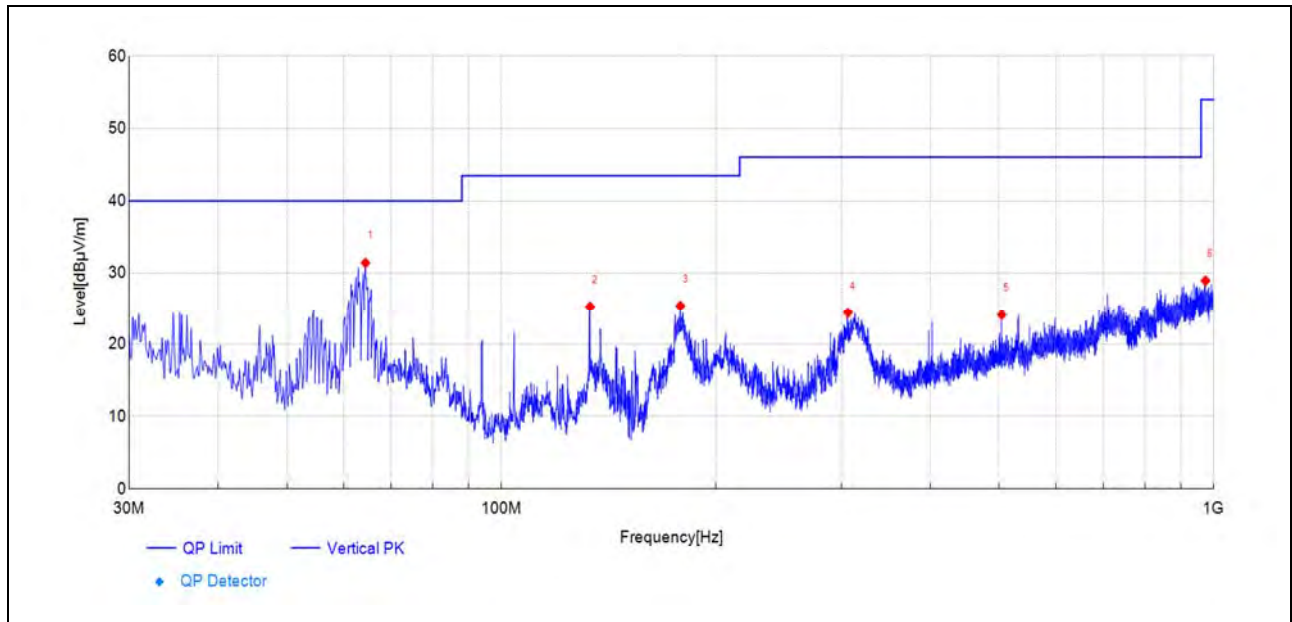
(Antenna Horizontal, 30MHz to 1GHz)

Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Verdict
62.98	54.2	25.21	-29.010	40.00	14.79	150	170	PK	PASS
132.94	63.1	31.24	-31.870	43.50	12.26	150	330	PK	PASS
206.90	58.1	28.65	-29.440	43.50	14.85	150	10	PK	PASS
403.21	53.6	30.76	-22.860	46.00	15.24	150	300	PK	PASS
665.84	48.0	31.80	-16.150	46.00	14.20	150	10	PK	PASS
974.17	44.8	33.90	-10.940	54.00	20.10	150	260	PK	PASS



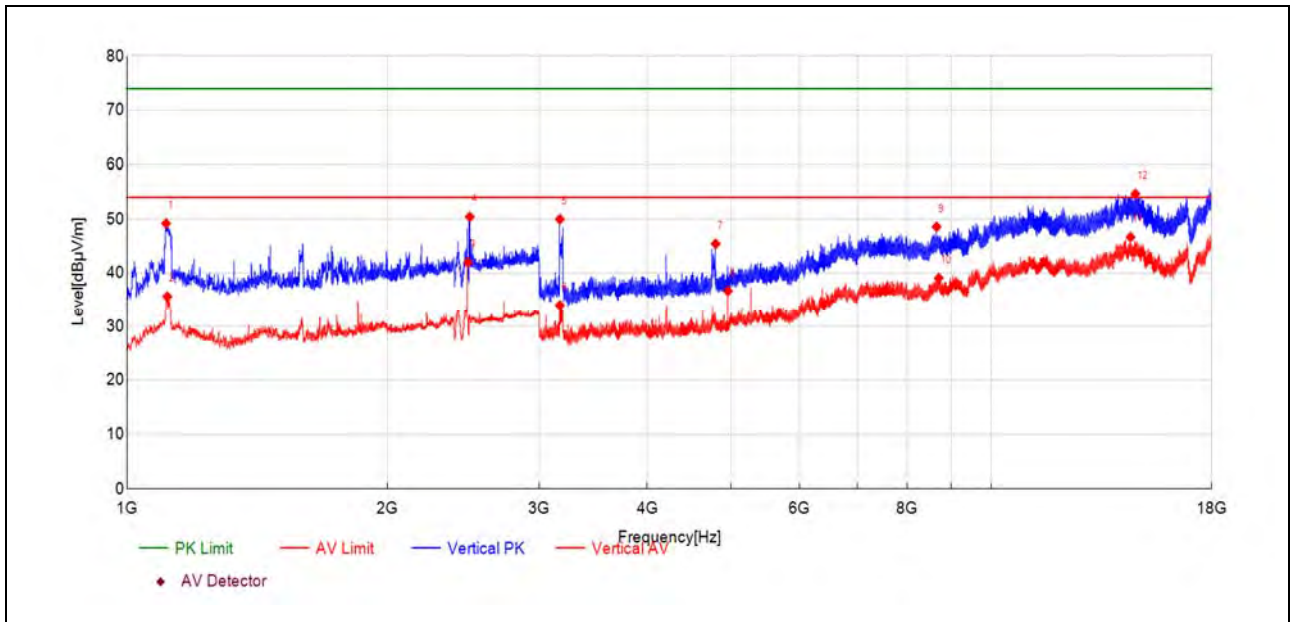
(Antenna Horizontal, 1GHz to 18GHz)

Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Verdict
1112.47	53.6	51.36	-2.250	74.00	22.64	150	171	PK	PASS
1112.47	39.5	37.24	-2.250	54.00	16.76	150	157	AV	PASS
1584.57	45.7	45.16	-0.530	74.00	28.84	150	240	PK	PASS
1597.47	31.7	31.27	-0.410	54.00	22.73	150	235	AV	PASS
2479.88	33.8	39.66	5.890	54.00	14.34	150	230	AV	N/A
2493.22	44.3	50.15	5.860	74.00	23.85	150	230	PK	PASS
3187.29	44.8	34.05	-10.73	54.00	19.95	150	36	AV	PASS
3187.29	58.6	47.86	-10.73	74.00	26.14	150	296	PK	PASS
4753.34	50.9	45.33	-5.550	74.00	28.67	150	304	PK	PASS
4753.76	38.1	32.55	-5.550	54.00	21.45	150	328	AV	PASS
14319.32	35.5	54.90	19.440	74.00	19.10	150	44	PK	PASS
14552.90	25.8	45.91	20.080	54.00	8.09	150	100	AV	PASS



(Antenna Vertical, 30MHz to 1GHz)

Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Verdict
64.44	60.6	31.42	-29.220	40.00	8.58	150	180	PK	PASS
133.18	57.2	25.31	-31.880	43.50	18.19	150	360	PK	PASS
178.29	56.2	25.42	-30.810	43.50	18.08	150	30	PK	PASS
306.57	49.7	24.45	-25.200	46.00	21.55	150	90	PK	PASS
503.97	44.6	24.13	-20.470	46.00	21.87	150	80	PK	PASS
973.93	39.9	28.94	-10.980	54.00	25.06	150	310	PK	PASS



(Antenna Vertical, 1GHz to 18GHz)

Fre. (MHz)	Reading [dBμV]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Verdict
1109.80	51.5	49.20	-2.270	74.00	24.80	150	155	PK	PASS
1113.36	37.9	35.62	-2.240	54.00	18.38	150	136	AV	PASS
2480.33	36.1	42.00	5.890	54.00	12.00	150	304	AV	N/A
2492.33	44.5	50.40	5.860	74.00	23.60	150	197	PK	PASS
3168.86	60.5	49.97	-10.570	74.00	24.03	150	236	PK	PASS
3168.86	44.6	34.01	-10.570	54.00	19.99	150	227	AV	PASS
4799.62	50.6	45.42	-5.180	74.00	28.58	150	312	PK	PASS
4959.91	41.3	36.67	-4.610	54.00	17.33	150	165	AV	PASS
8646.16	42.5	48.57	6.070	74.00	25.43	150	182	PK	PASS
8698.45	32.4	39.08	6.700	54.00	14.92	150	360	AV	PASS
14498.90	26.9	46.66	19.790	54.00	7.34	150	88	AV	PASS
14686.62	34.1	54.68	20.560	74.00	19.32	150	358	PK	PASS

————— END OF REPORT —————